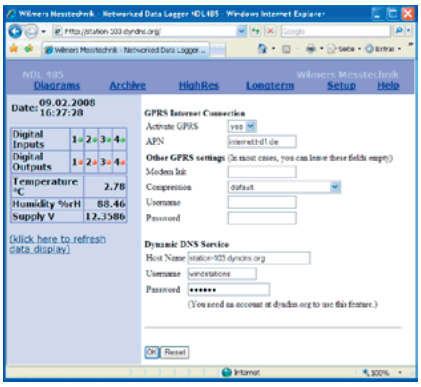
Manual

Data Logger blueberry COMPACT



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IMPRINT

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This manual relates to firmware release 3.2.6 of the data logger **blueberry COMPACT** (partNo. 0141).

2014-03-03

Contents

Introduction

The **blueberry COMPACT** is an all-in-one data logger system. It features digital and analogue measurement inputs for the connection of sensors providing pulses, voltage or current signals. A serial **RS485** bus interface allows the connection of sonic anemometers and other sensors with **RS485** interface. The **blueberry COMPACT** is integrated into the Internet via GSM/GPRS or DSL. It sends measured data automatically via E-Mail and FTP. The Ethernet port and the integrated web interface provide fast data transmission to a PC or a LAN and easy access via a web browser.

Getting Started

Scope of Delivery

The following components are supplied with the data logger **blueberry COMPACT:**

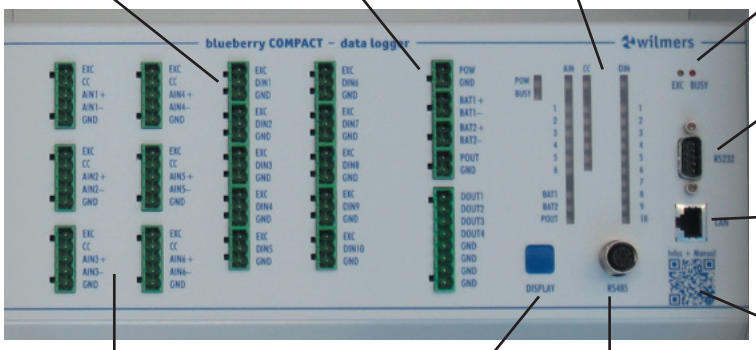
- Data logger in a rugged weatherproof enclosure
- Crosspatch Ethernet cable for local data connection

DIN1 .. DIN10
digital measurement inputs for TTL or small AC signals

POW + GND
solar power supply connection
POW = (+), **GND** = (–)

LED display
indicate the status of the measurement inputs and of the power supply

BUSY indicator
flashes every 2 seconds in normal operation



RS232
serial port for connection to the integrated GSM/GPRS modem or to an external modem**ry GSM module**

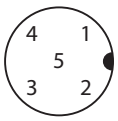
LAN
Ethernet port for connection to a PC, a router or a PC network

QR code
Scan the QR code with a smartphone to get further information about the **blueberry COMPACT** (manual, data sheet, brochures, wiring diagrams, firmware updates)

AIN1 .. AIN6
analogue measurement inputs for 0..10V signals, potentiometric wind vanes, Pt100 temperature sensors, thermopile pyranometers

Display button
press the button to activate the LED display for 3 minutes

RS485 port + excitation
pin 1 = n.c.
pin 2 = EXC (+)
pin 3 = GND
pin 4 = RS485+
pin 5 = RS485–



Installation

Please proceed as follows to install and to test the **blueberry COMPACT** data logger:

1. Install the **blueberry COMPACT** to the mast.

2. Remove the battery cover plate and insert the two sealed lead batteries and connect them to **BAT1** and **BAT2**. Please use only the battery types stated on the label in the data logger shelter box.

3. Insert the battery cover plate and tighten the fixing screw.

NOTE: Never disconnect the backup batteries from the data logger when a solar module is connected. This may damage the data logger.

4. Connect a 12V solar module (60 Wp) to the **POW** (+) and **GND** (–) terminals of the terminal strip. The **BUSY** indicator LED is steadily alight. The boot process takes approx. 2 minutes. The data logger is fully operating when the **BUSY** LED flashes in regular intervals of 2 seconds.

NOTE: Never connect a solar module to the data logger before batteries are connected. This may damage the data logger.

   Optionally, a 24 VDC (15..30 VDC / max. 5A) power supply can be connected instead of the solar module. The integrated charge controller will charge the backup batteries working as a UPS.

5. Plug the crosspatch cable into the **LAN** connection at the front plate of the **blueberry COMPACT**. Connect the crosspatch cable to the Ethernet interface of a PC or notebook.

6. Adapt the network settings of the PC to the IP address of the **blueberry COMPACT**. The network parameters are indicated on a label at the bottom of the housing of the data logger.

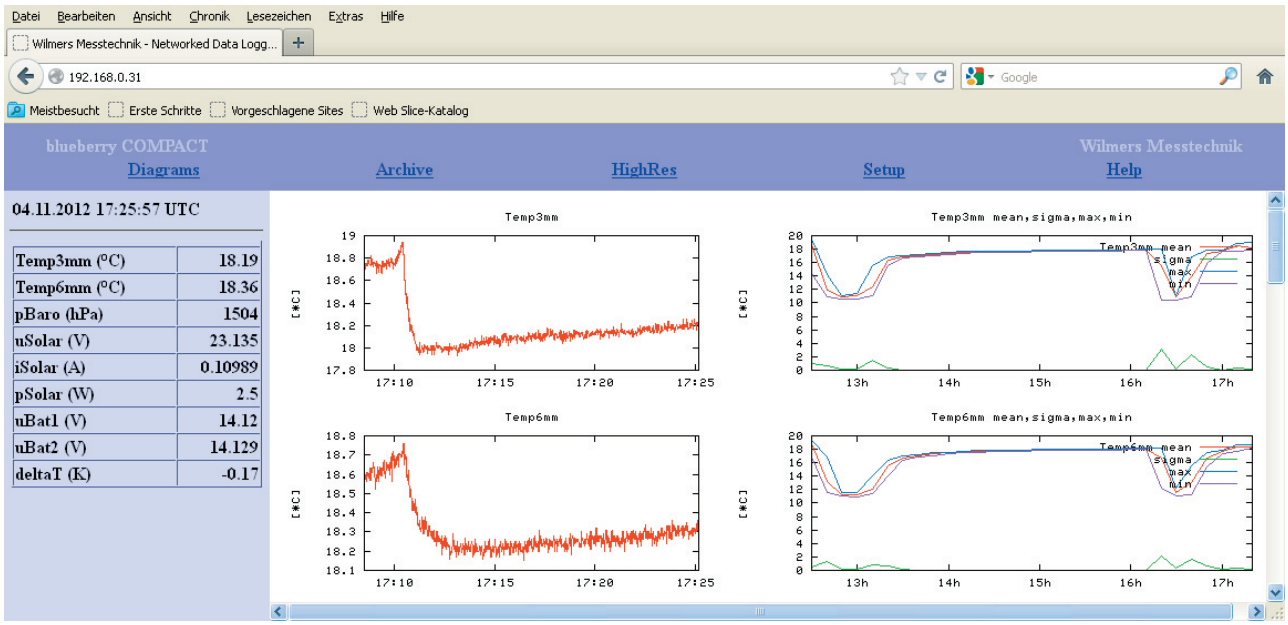
7. Start your Internet browser, enter the IP address of the data logger into the address field and type **<enter>**. Enter the access code into the login dialog:

   user: **admin**
   password: **** *(=admin password)*

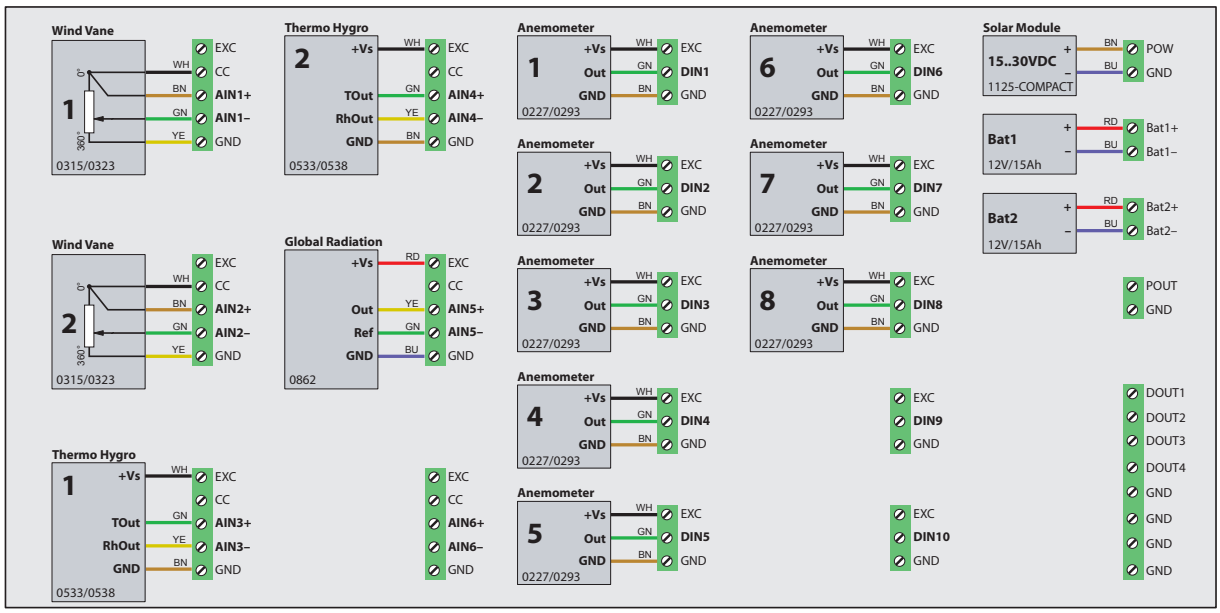
8. You should now see a screen similar to the image below.

9. Connect sensors or test signals to the terminals at **DIN1** .. **DIN10** and **AIN1** .. **AIN6**. Enter the measurement functions according to chapter **Measurement Setup** of this manual.

Delivered within a complete measurement system the **blueberry COMPACT** usually provides a wiring diagram attached to the lid of the shelter box. The **blueberry COMPACT** includes built-in overvoltage protection for all terminals. The following image shows the **blueberry COMPACT** data logger with backup batteries connected, the **GSM module** that integrates the data logger into the Internet via GPRS.



Data Logger **blueberry COMPACT** - Sensor Connections



Farben / Colors / Couleurs
WH = weiß / white / blanc
BN = braun / brown / marron
GN = grün / green / vert
YE = gelb / yellow / jaune
GY = grau / grey / gris
PK = rosa / pink / rose
BU = blau / blue / bleu
RD = rot / red / rouge
BK = schwarz / black / noire
VT = violett / violet / violet
GNYE = grün-gelb / green-yellow / vert-jaune

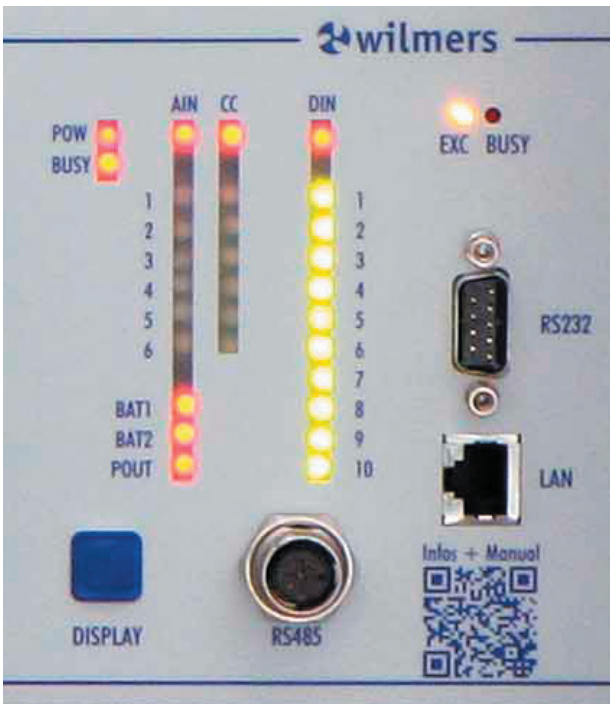
Infos + Manual

d)-2012-11-05

LED Display

The **blueberry COMPACT** provides an array of LEDs that indicate the status of the measurement inputs and of the power supply. Press the **DISPLAY** button to activate the LEDs for 3 minutes.

Significance of the LEDs			
LED	**Off**	**Red**	**Green**
POW	Supply Voltage <11 V	Supply Voltage 11..16 V	Supply Voltage >16 V
BUSY	-	Received an invalid telegram	Received a valid telegram
AIN (top)	-	Analogue Excitation On	Analogue Excitation Off
CC (top)	-	Constant Current On	Constant Current Off
DIN (top)	-	Digital Excitation On	Digital Excitation Off
AIN1..6	<0.05 V	0.05..0.5 V	>0.5 V
CC1..6	<0.1 mA	0.1..0.9 mA	>0.9 mA
DIN1..10	-	High	Low
BAT1	<11 V	11..13 V	>13 V
BAT2	<11 V	11..13 V	>13 V
POUT	-	On	Off



QR Code (Infos + Manual)

Scan the QR code with your smartphone in order to get further information about the **blueberry COMPACT**. The QR code links to a website that provides technical data, manual, wiring schemes, brochure, application notes and firmware updates for the data logger. The website is also available under the following link:

http://wilmers.com/blueberry-compact

Web Interface

Introduction

The user surface of the data logger **blueberry COMPACT** is a web interface. Configuration of the data logger, display and download of measured data requires a web browser (e.g., Firefox, Opera, Internet Explorer, Safari). The data logger is connected to the PC via local Ethernet connection or via remote data transmission (GSM, GPRS, UMTS, CDMA, DSL, Satellite).

Start the browser, enter the IP address of the data logger into the address field and type **<enter>**. Enter the access code into the login dialog. The **blueberry COMPACT** provides two user levels:

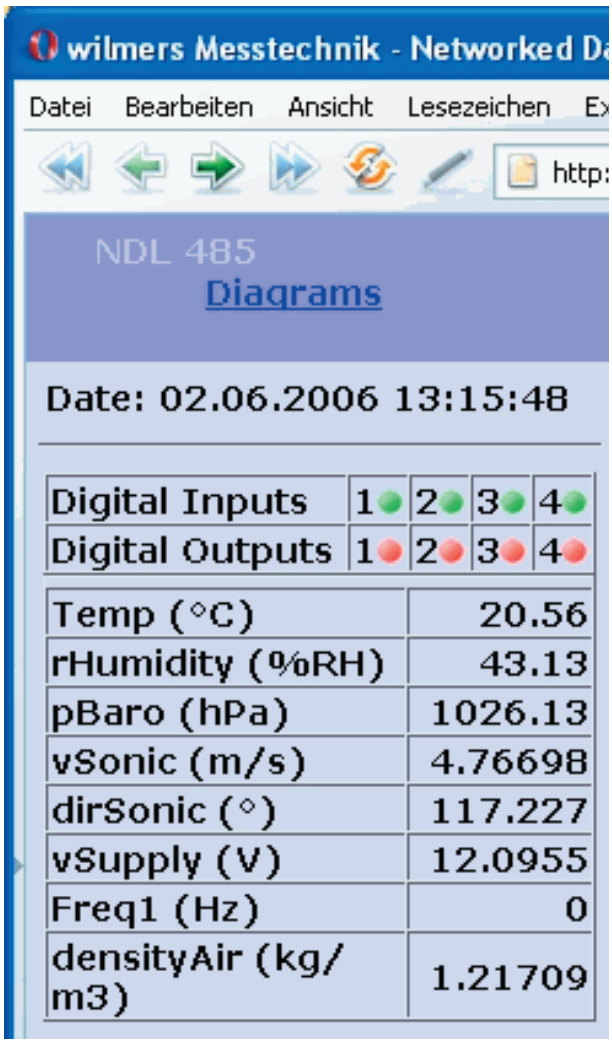
The user **guest** is allowed to display actual measured values and configuration settings and to download measured data. He cannot delete any data or change configuration settings. He is only allowed to set date and time.

The user **admin** has all rights. In addition to the **guest** rights he is allowed to delete measured data and to change the configuration.

Data Display

Displaying Actual Measured Values

The left part of the screen displays in a table all actual measured values. When the data logger is connected locally these values are automatically updated. At remote connections, please click on



Refresh Data View below the data table in order to update the display. Measured values are displayed as floating point numbers with the significant number of characters after the decimal point.

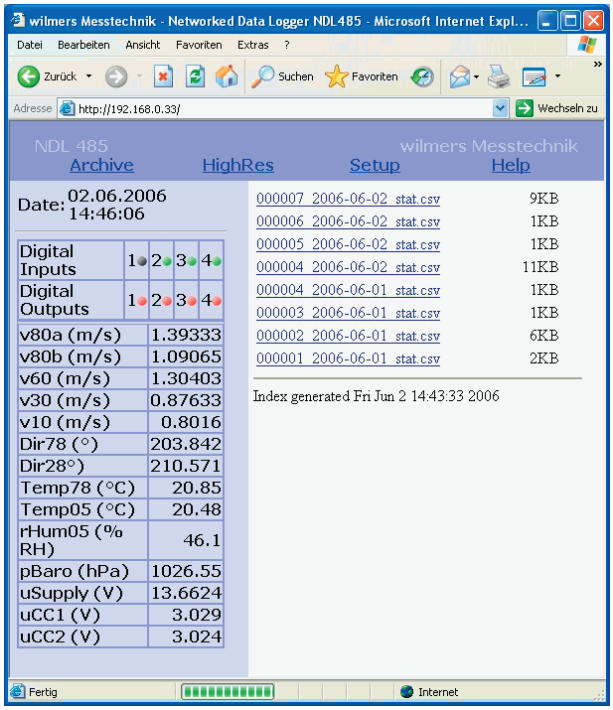
Data Transfer

Downloading Measured Data

The **blueberry COMPACT** contains two ring buffer data memories; one for the statistics, one for the samples. Actual data overwrite the oldest data lines which makes the deletion of the memory unnecessary.

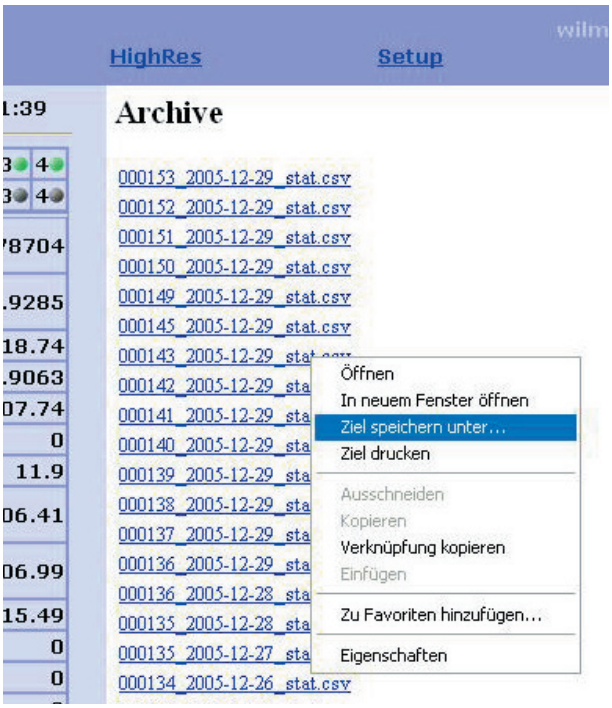
Select **Archive** in order to display a list of all stored statistics files. The **blueberry COMPACT** creates one statistics file per day. These files contain time series of the statistical evaluations of the samples. The file name contains the index of the actual measurement, the date and the tag **stat** for ‚statistics'. The data logger increments the index every time the configuration is changed or the data logger reboots.

Example: **000024_2004-03-19_stat.csv**



Select **HighRes** in order to display a list of all stored samples files. The **blueberry COMPACT** creates one CSV file per hour. These files contain time series of all measured samples. The file name contains the index of the actual measurement, date and time, and the tag **meas** for ‚measurement'.

Example: **000024_2004-03-19_15_meas.csv**

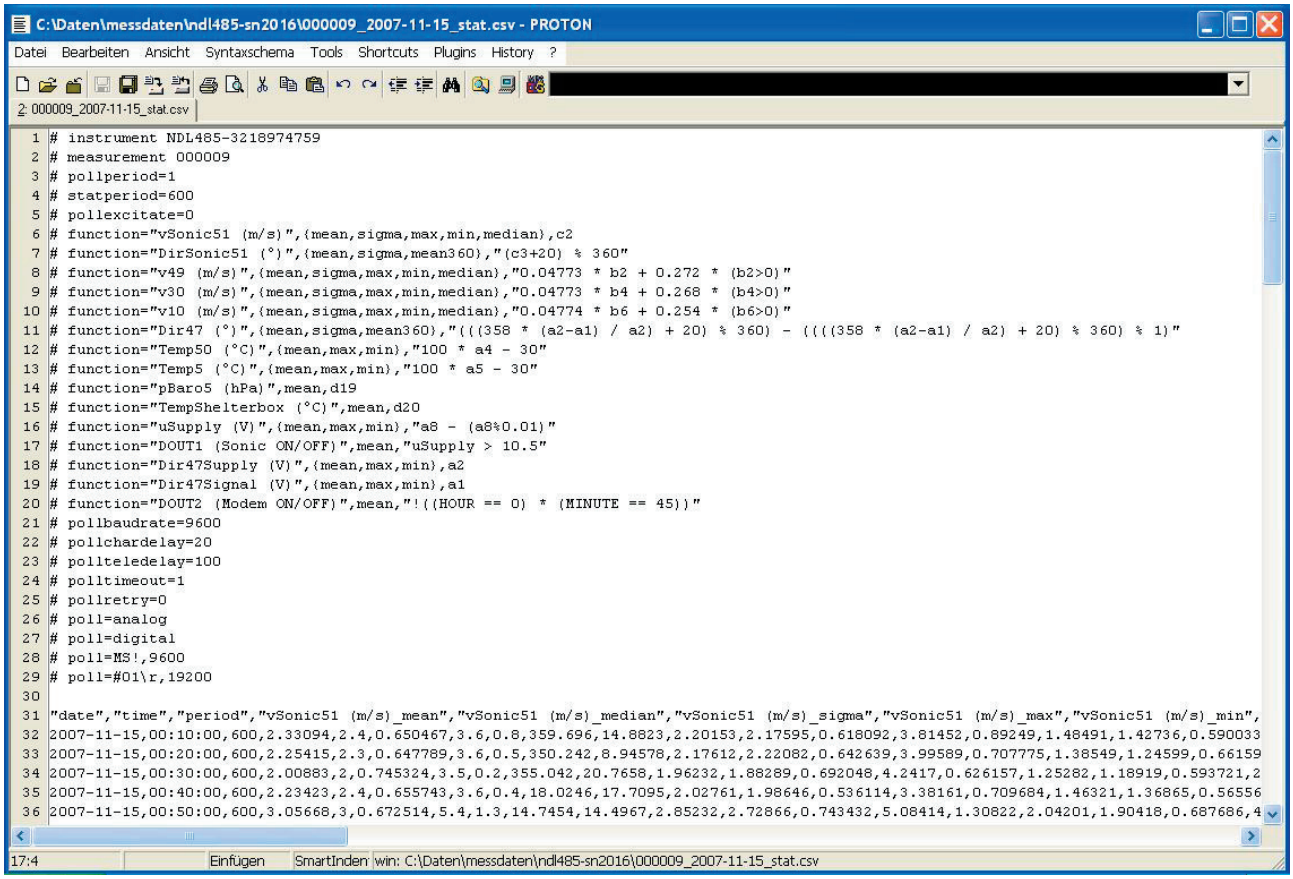


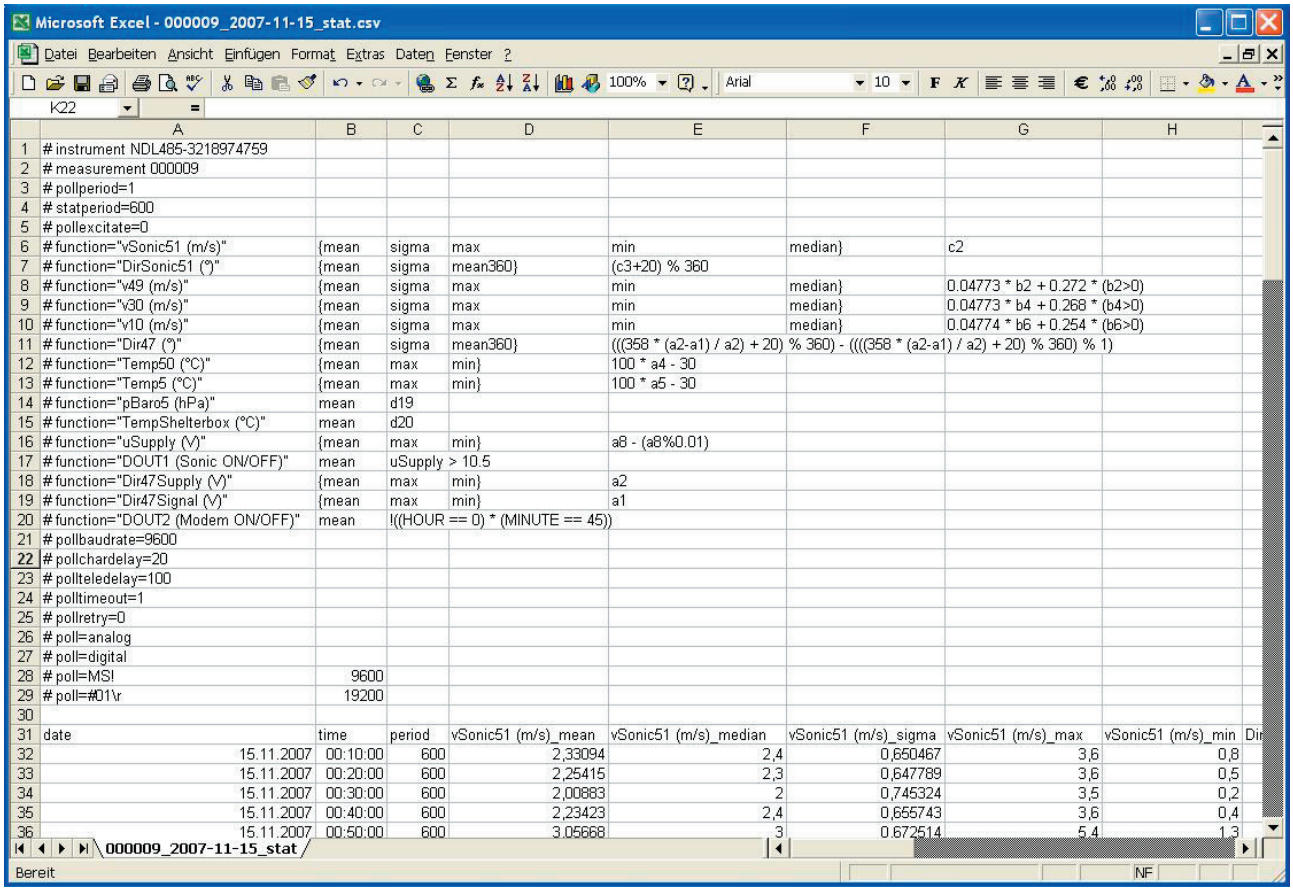
Downloading measured data works like a download from an Internet site: click with the right mouse button on a file, select **Save file as...** from the pull-down menu, enter the destination path and click **OK**.

CSV files can be imported into data analysis software like **WAsP** or **WindPRO**. Double-clicking on the CSV file opens it directly in **MS-Excel**.

Data Format

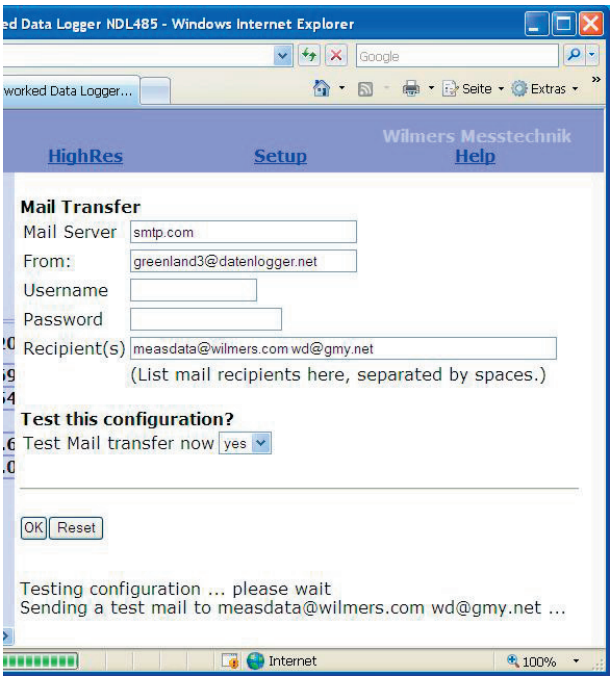
The **blueberry COMPACT** stores measured data as comma separated ASCII files (CSV). Each data file contains a header which indicates information about the data logger and the measurement configuration: serial number of the data logger, index of the measurement, site info, measurement functions and parameter settings. The header is followed by an empty line and a line with column headers. The measured data lines have the format: date, time, period, measured values. Decimal delimiter is a dot (e.g., **2.564**), columns are separated by a comma.


C:\Daten\messdaten\ndl485-sn2016\000009_2007-11-15_stat.csv - PROTON
Datei Bearbeiten Ansicht Syntaxschema Tools Shortcuts Plugins History ?
2 000009_2007-11-15_stat.csv
1 # instrument NDL485-3218974759
2 # measurement 000009
3 # pollperiod=1
4 # statperiod=600
5 # pollexcitate=0
6 # function="vSonic51 (m/s)",(mean,sigma,max,min,median),c2
7 # function="DirSonic51 (°)",(mean,sigma,mean360),"(c3+20) % 360"
8 # function="v49 (m/s)",(mean,sigma,max,min,median),"0.04773 * b2 + 0.272 * (b2>0)"
9 # function="v30 (m/s)",(mean,sigma,max,min,median),"0.04773 * b4 + 0.268 * (b4>0)"
10 # function="v10 (m/s)",(mean,sigma,max,min,median),"0.04774 * b6 + 0.254 * (b6>0)"
11 # function="Dir47 (°)",(mean,sigma,mean360),"(((358 * (a2-a1) / a2) + 20) % 360) - ((((358 * (a2-a1) / a2) + 20) % 360) % 1)"
12 # function="Temp50 (°C)",(mean,max,min),"100 * a4 - 30"
13 # function="Temp5 (°C)",(mean,max,min),"100 * a5 - 30"
14 # function="pBaro5 (hPa)",mean,d19
15 # function="TempShelterbox (°C)",mean,d20
16 # function="uSupply (V)",(mean,max,min),"a8 - (a8%0.01)"
17 # function="DOUT1 (Sonic ON/OFF)",mean,"uSupply > 10.5"
18 # function="Dir47Supply (V)",(mean,max,min),a2
19 # function="Dir47Signal (V)",(mean,max,min),a1
20 # function="DOUT2 (Modem ON/OFF)",mean,"!((HOUR == 0) * (MINUTE == 45))"
21 # pollbaudrate=9600
22 # pollchardelay=20
23 # pollteledelay=100
24 # polltimeout=1
25 # pollretry=0
26 # poll=analog
27 # poll=digital
28 # poll=MS!,9600
29 # poll=#01\r,19200
30
31 "date","time","period","vSonic51 (m/s)_mean","vSonic51 (m/s)_median","vSonic51 (m/s)_sigma","vSonic51 (m/s)_max","vSonic51 (m/s)_min",
32 2007-11-15,00:10:00,600,2.33094,2.4,0.650467,3.6,0.8,359.696,14.8823,2.20153,2.17595,0.618092,3.81452,0.89249,1.48491,1.42736,0.590033
33 2007-11-15,00:20:00,600,2.25415,2.3,0.647789,3.6,0.5,350.242,8.94578,2.17612,2.22082,0.642639,3.99589,0.707775,1.38549,1.24599,0.66159
34 2007-11-15,00:30:00,600,2.00883,2,0.745324,3.5,0.2,355.042,20.7658,1.96232,1.88289,0.692048,4.2417,0.626157,1.25282,1.18919,0.593721,2
35 2007-11-15,00:40:00,600,2.23423,2.4,0.655743,3.6,0.4,18.0246,17.7095,2.02761,1.98646,0.536114,3.38161,0.709684,1.46321,1.36865,0.56556
36 2007-11-15,00:50:00,600,3.05668,3,0.672514,5.4,1.3,14.7454,14.4967,2.85232,2.72866,0.743432,5.08414,1.30822,2.04201,1.90418,0.687686,4
17:4 Einfügen SmartIndent win: C:\Daten\messdaten\ndl485-sn2016\000009_2007-11-15_stat.csv


Microsoft Excel - 000009_2007-11-15_stat.csv
Datei Bearbeiten Ansicht Einfügen Format Extras Daten Fenster ?
K22
A B C D E F G H
1 # instrument NDL485-3218974759
2 # measurement 000009
3 # pollperiod=1
4 # statperiod=600
5 # pollexcitate=0
6 # function="vSonic51 (m/s)" (mean sigma max min median) c2
7 # function="DirSonic51 (°)" (mean sigma mean360) (c3+20) % 360
8 # function="v49 (m/s)" (mean sigma max min median) 0.04773 * b2 + 0.272 * (b2>0)
9 # function="v30 (m/s)" (mean sigma max min median) 0.04773 * b4 + 0.268 * (b4>0)
10 # function="v10 (m/s)" (mean sigma max min median) 0.04774 * b6 + 0.254 * (b6>0)
11 # function="Dir47 (°)" (mean sigma mean360) (((358 * (a2-a1) / a2) + 20) % 360) - ((((358 * (a2-a1) / a2) + 20) % 360) % 1)
12 # function="Temp50 (°C)" (mean max min) 100 * a4 - 30
13 # function="Temp5 (°C)" (mean max min) 100 * a5 - 30
14 # function="pBaro5 (hPa)" mean d19
15 # function="TempShelterbox (°C)" mean d20
16 # function="uSupply (V)" (mean max min) a8 - (a8%0.01)
17 # function="DOUT1 (Sonic ON/OFF)" mean uSupply > 10.5
18 # function="Dir47Supply (V)" (mean max min) a2
19 # function="Dir47Signal (V)" (mean max min) a1
20 # function="DOUT2 (Modem ON/OFF)" mean !((HOUR == 0) * (MINUTE == 45))
21 # pollbaudrate=9600
22 # pollchardelay=20
23 # pollteledelay=100
24 # polltimeout=1
25 # pollretry=0
26 # poll=analog
27 # poll=digital
28 # poll=MS! 9600
29 # poll=#01\r 19200
30
31 date time period vSonic51 (m/s)_mean vSonic51 (m/s)_median vSonic51 (m/s)_sigma vSonic51 (m/s)_max vSonic51 (m/s)_min
32 15.11.2007 00:10:00 600 2,33094 2,4 0,650467 3,6 0,8
33 15.11.2007 00:20:00 600 2,25415 2,3 0,647789 3,6 0,5
34 15.11.2007 00:30:00 600 2,00883 2 0,745324 3,5 0,2
35 15.11.2007 00:40:00 600 2,23423 2,4 0,655743 3,6 0,4
36 15.11.2007 00:50:00 600 3,05668 3 0,672514 5,4 1,3
000009_2007-11-15_stat
Bereit NF

Transmitting Measured Data via E-Mail

The **blueberry COMPACT** sends measured data automatically via e-mail every day at 0:00. The CSV data file of the previous day is attached to the e-mail. If several files have been created since last e-mailing (e.g., because of configuration changes or rebooting of the data logger) all closed files are send. Each file is attached to a separate e-mail. Please first setup the Internet integration via GPRS or DSL.



To setup the e-mail data transfer select **Setup > FTP/Mail**.

Enter the URL of your mail server (SMTP server) in the field **Mail Server**. If your mail server requires authorization enter the user name and password. Enter the mail addresses in the field **Recipient(s)**. Separate more than one mail address by space characters.

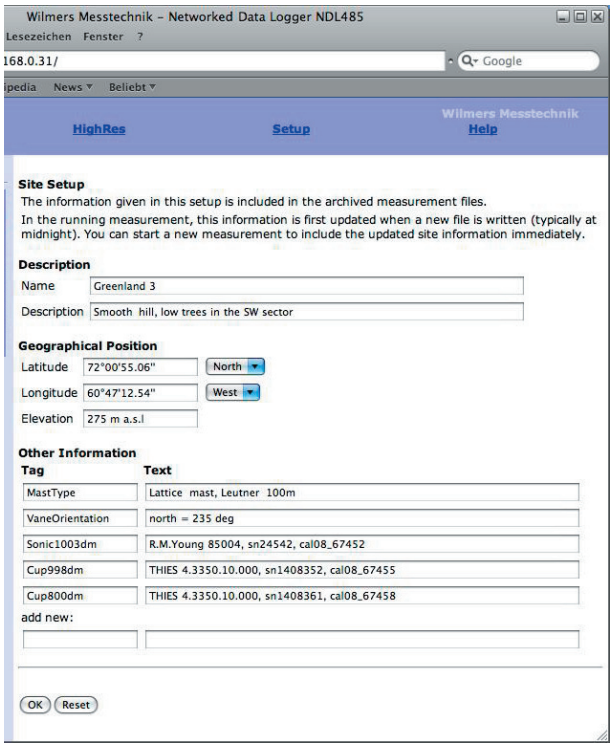
Select **yes** at **Test Mail Transfer now**.

Click **OK** to save the settings. If the **Test Mail** option is active the **blueberry COMPACT** now sends a test mail to all recipients. A message displays the result of the test mailing. Please check whether the mail has been sent without errors. Otherwise, please check the correctness of your mail settings.

Site Description

The **blueberry COMPACT** saves information about the measurement. They are stored in the header of each CSV data file for proper documentation of the measurement process.

To enter the information about the measurement select **Setup > Site Description**.



Documentation of the measurement includes the following information:

Name Name of the measurement site

Description Description of the measurement location and its environment. Please enter here orography, roughness, obstacles and other elements having an impact on the measurement result.

Geographical Position Enter here latitude, longitude and elevation of the measurement site.

Other Information Use these universal input fields to enter all supplementary information about the measurement:
e.g., geographical coordinate system, mast type, mast dimen-

sions, type, serial numbers and calibration numbers of the sensors, dimensions and alignment of sensor mounting booms

Measurement Setup

Measurement Parameters

To define measurement parameters or sensor characteristics select **Setup > Measurement**.

Measure Period Measure period is the time interval in which the data logger records actual measured values (samples) from all sensors.

Statistic Interval Statistic interval is the time interval in which the data logger performs a statistical evaluation of the samples and stores the results in the memory. The variables a1..an correspond to the first to nth value of the data line sent by the first sensor. The variables b1..bn correspond to the values sent by the second sensor and so further.

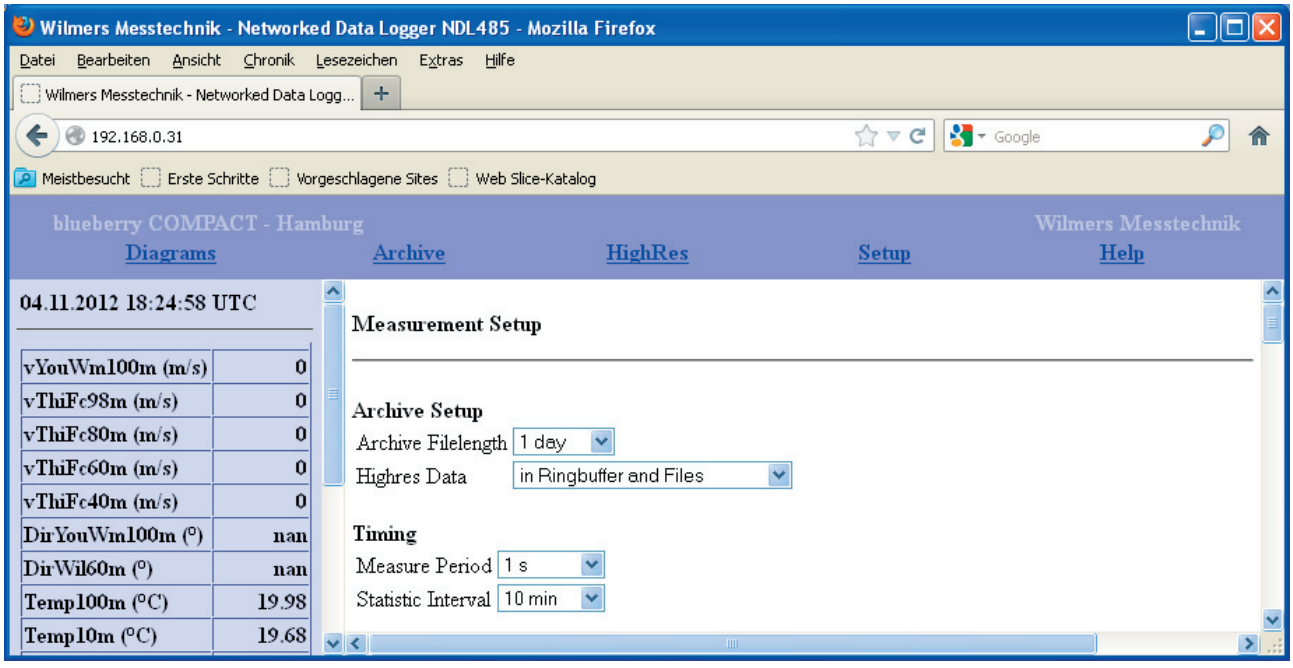
Excitation defines how long the sensor constant current source (**CC**) is switched on before the **blueberry COMPACT** sends a poll command. Selecting **always on** switches the excitation voltage continuously on. The **blueberry INPUT Module** requires this setting as it needs a warm-up time of approx. 5 seconds.

Measurement Functions (Standard Setup)

To add a new measurement function enter a function name in the field **Name,** check the required statistical evaluations and enter the measurement function. Type **<enter>** to transmit the settings to the data logger.

Function Names

Variable names may principally contain umlauts (**ä**, **ö**, **ü**) and special characters like comma (**,**) and period (**.**). If function names are used as variables in further measurement functions the first part of the function name may however only contain the following characters: **A..Z**, **a..z**, **0..9**, **_**. The second part, i.e. the part after the first space character is used as axis label for realtime diagrams. We recommend to use the following syntax for function names: **Value (unit)**.



Example:
*vWind80m (m/s) = 0.04727 * b10 + 0.264 * (b10>0)*

The first part of the function name can be used as variable ***vWind80m*** in further measurement functions.

The diagram title for this function is ***vWind80m***, the y axis label is ***(m/s)***.

Digital Measurement Inputs (DIN1..10)

The table **Digital Inputs** provides one line for each of the 10 digital measurement inputs DIN1..10.

Enter the function name into the field **Name.**

Select the signal type from the **Type** list:

--- if the input is not used.

Frequency TTL for TTL pulse frequency signals [Hz], from anemometers like Thies First Class, Vector A100, Heval ECONOMY or RISØ reed switch anemometer with external pullup resistor.

Frequency AC for small AC frequency signals [Hz], from wind sensors like R.M.Young Wind Monitor

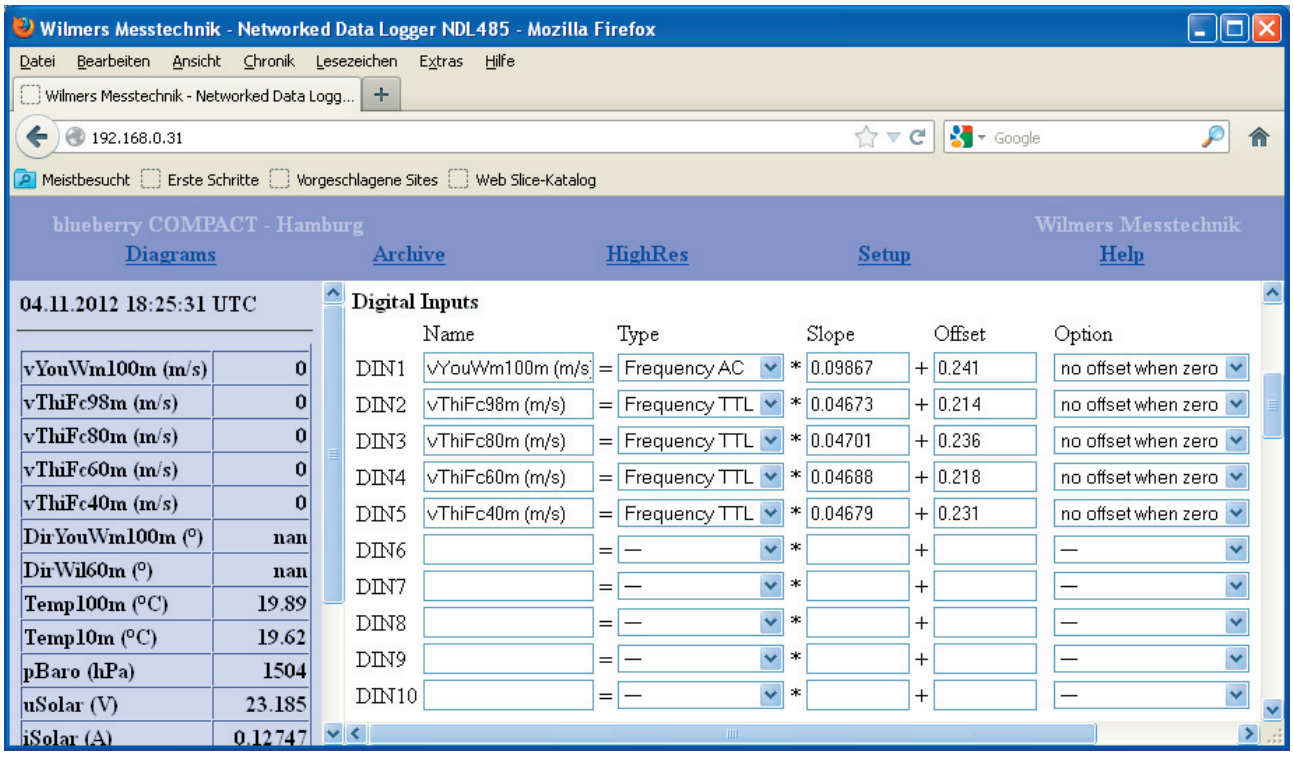
Counter if you want to count pulses, e.g., from a tipping bucket rain gauge.

Select the **Slope** and **Offset** for the transfer function of the respective input. Take these values from the sensor data sheet or from the calibration certificate for individually calibrated sensors.

Select the option from the **Option** list:

--- if no option required.

no offset when zero suppresses the offset for 0 Hz frequency signals. Select this option for anemometers because otherwise wind speed will record the anemometer offset value at zero wind speed.



Analogue Measurement Inputs (AIN1..6)

The table **Analog Inputs** provides one line for each of the 6 analogue measurement inputs AIN1..6.

Enter the function name into the field **Name**.

Select the signal type from the **Type** list:

--- if the input is not used.

Voltage provides the voltage between **AIN+** and **AIN–** of the respective analogue input. If the sensor does not provide a reference for the measurement signal **AIN–** must be connected to **GND**.

Temperature (Pt100) for passive Pt100 temperature sensors connected in 4-wire technique. The blueberry COMPACT automatically converts the voltage into temperature according to IEC751.

Potentiometer 0..1 provides the dimensionsless value of a potentiometer.

Direction 0..360° provides the 0..360° wind direction of a potentiometric wind vane connected in 4-wire technique. Direction value increases when the vane rotates clockwise.

Direction 360..0° provides the 0..360° wind direction of a potentiometric wind vane connected in 4-wire technique. Direction value increases when the vane rotates anti-clockwise.

Resistance provides the electrical resistance [Ω] of a resistor connected in 4-wire technique. Use this option for PTC or NTC temperature sensors.

Select the **Slope** and **Offset** for the transfer function of the respective input. Take these values from the sensor data sheet or from the calibration certificate for individually calibrated sensors.

Measurement Functions (Expert Setup)

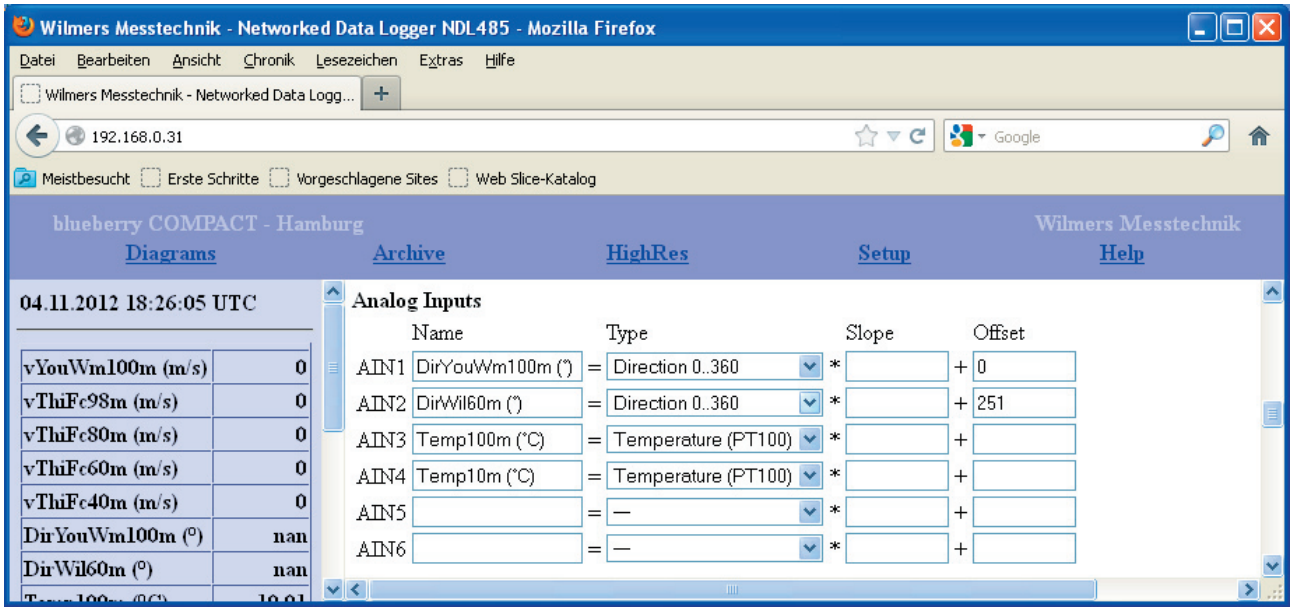
The Expert Setup allows input of virtual measurement functions similar to the data logger **blueberry NDL485**.

To add a new measurement function enter a function name in the field **Name,** check the required statistical evaluations and enter the measurement function. Type **<enter>** to transmit the settings to the data logger.

Maximum length of the measurement function including function name and statistics options is 1023 characters or 64 elements. Each variable or operator counts as one element. Please use the following elements to built the measurement function:

Arithmetic Operators

+ Addition



– Subtraction or minus sign. If a **–** is used to characterize a negative number at the beginning of a measurement function or after another operator the number must be put into parenthesis.

Example: **Negative Numbers**

*HumAir (%RF) = (-25) + 62.5 * a5*
vSonic (m/s) = e2 else (-9999)

***** Multiplication

/ Division

^ Exponent, real number

Example: **Length of a Vector**

uSonic (m/s)= d2
vSonic (m/s)= d3
wsHorizontal (m/s)=(uSonic^2 + vSonic^2)^0.5

This function converts the **u** and **v** components of a sonic anemometer to horizontal wind speed.

% Modulo division. This operator provides the positive residue of a division. Unlike the general modulo operator defined for integer numbers, the **blueberry COMPACT** modulo operator is based on real (floating point) numbers for parameters and for the result. The second parameter of the **%** function must be positive (**a % b** with b>0).

Example: **Wind Direction**

*Dir (°) = (360 * b1 / b0 + 126) % 360*

The measured wind direction value with an offset correction of ***126*** degrees is projected into the range of 0..360°.

sin Sine function. The angle must be defined in degrees.

Example: **Vector Component**

vWind (m/s) = 0.04752 * b8 + 0.224 * (b8>0)
dirWind (°) = (360 * (a1-a2)/a1) % 360
vEast (m/s) = vWind * sin (dirWind)

The multiplication of the wind speed with the sine of the wind direction results in the eastern component of the total wind speed vector.

cos Cosine function. The angle must be defined in degrees.

Example: **Vector Component**

*vWind (m/s) = 0.04752 * b8 + 0.224 * (b8>0)*
*dirWind (°) = (360 * (a1-a2)/a1) % 360*
*vNorth (m/s) = vWind * cos (dirWind)*

The multiplication of the wind speed with the sine of the wind direction results in the northern component of the total wind speed vector.

ln Natural logarithm

Example: *log = ln c7*

Boolean Operators

> Comparison **superior to**. The result is **1**, if the condition is true, otherwise it is **0**.

Example: **Calibrated Cup Anemometer**

*ws30m (m/s)= 0.04827 * c2 + 0.19 * (c2 > 0)*

This function suppresses the wind speed offset when the frequency is ***0***. Otherwise, even at total calm the data logger would indicate a wind speed of ***0.19*** m/s.

< Comparison **inferior to**. The result is **1**, if the condition is true, otherwise it is **0**.

Example: **Status from Threshold Value**

*Temperature (Celsius) = 20 * a4 - 40*
Frost = Temperature < 0

The comparison with a threshold value creates the status signal **1 = frost** / **0 = no frost**.

== Comparison **equal**. The result is **1**, if the condition is true, otherwise it is **0**.

Example:

*identic (1=equal) = (0.2 * a2) == 1.2*

This function compares a measured value with a constant.

!= Comparison **not equal**. The result is **1**, if the condition is true, otherwise it is **0**.

Example:

differentStatus (1=different) = c1 != c2
with third poll command: **DIN**

This function compares the status of digital inputs **DIN1** and **DIN2**.

>= Comparison **superior or equal**. The result is **1**, if the condition is true, otherwise it is **0**.

Example:

condensation = Humidity >= 100.1

Relative humidity of more than 100 %RH is considered as condensation.

<= Comparison **inferior or equal**. The result is **1**, if the condition is true, otherwise it is **0**.

! **NOT** operator. This operator inverts the logical level of a boolean value.

Example:

DOUT2 = ! a1
with first poll command: **DIN**

Switching output **DOUT2** is set active if the status signal at digital input **DIN1** is low.

valid This operator checks whether a value is a valid number. The result is **0**, if the value is **nan**, otherwise it is **1**.

Examples: **Validity Check**

*checkValue (1=Ok) = valid (2.45 * a1)*
*error (1=invalid) = ! valid (2.45 * a1)*

if This operator checks whether a value is not **0** or **nan**. The **if** operator is typically combined with the **else** operator.

Example: **Output Limitation**

*Hum (%RH) = 100*a4 if (100*a4<=100) else 100*

In case of condensation, some thermo hygro sensors show measured values above 100 %RH. This function limits the output of relative humidity to 100 %RH.

Example: **Validity Check**

*vCup (m/s) = 0.253 * b8 + 0.22 * (b8>0)*
vValid (m/s) = vCup if ((vCup>=0)(vCup<90))*

This function defines a range of ***0*** to ***90 m/s*** for valid wind speed values. The result of ***vValid*** is ***vCup*** if ***vCup*** is within this range, otherwise it is **nan**.

else replaces a value if the value is **nan**.

Example: **Filtering of invalid Samples**

uSonic (m/s) = d2 else #uSonic else 0

If the sonic anemometer returns an invalid value, the data logger will keep the previous value. If the previous value is also invalid the result is set to ***0***.

Example: **Marking of invalid Samples**

*relHum (%RH) = 100*a2 else (-9999)*

Invalid samples (**nan**) are stored as ***–9999***.

Combining boolean Results:

The multiplication operator ***** corresponds to the logical **AND** operator. The addition operator **+** corresponds to the non exclusive **OR** operator.

Example: **AND, non exclusive OR and exclusive OR**

*AND = (a2>=0) * (a2<=100)*

OR = (a2<0) + (a5<0)

*XOR = **(**(a2<0) + (a5<0)**) == 1***

Rounding Operators

abs provides the unsigned floating point value of a signed value.

Example:

*alwaysPositive = **abs (125 * g7 –75)***

int removes the decimal part of the floating point value.

Example:

*intValue = **int (–2.45 * d2 + 100)***

round rounds the floating point value to the nearest integer (up or down).

Example: **Display without Decimals**

*LowResDir (deg) = **round((360 * a2/a1) % 360)***

This function displays the wind direction without decimals.

Example: **Fixed Number of Decimals**

*Radiation = **0.01 * round(100 * (2.645*a2–25))***

The floating point function result is reduced to 2 decimals.

Other Operators

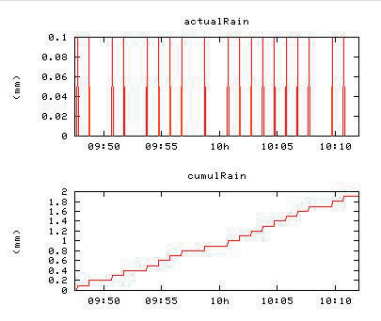
( ) Parantheses structure the function elements and determine the calculation sequence.

provides the previous value of the measurement function.

Example: **Cumulated Rainfall**

*actualRain (mm) = 0.1 * b3*
cumulRain (mm) =
(#cumulRain + (actualRain else 0))
else actualRain else 0

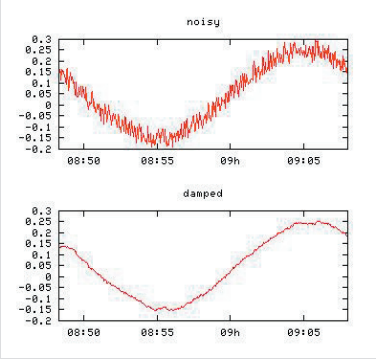
These two functions record actual and cumulated rainfall. ***cumulRain*** adds the actual rainfall to the previous cumulated rainfall. When the measurement starts ***#cumulRain*** is invalid because no previous value exists. The result is then replaced by ***actualRain***. If this value is also invalid the result is set to ***0***. The ***else*** operator defines the starting value and prevents the cumulative value from being reset in case of an invalid value of ***actualRain***.



Example: **Low Pass Filter**

*noisy = 62.5 * a6 – 55*
damped = (0.1 * noisy + 0.9 * #damped) else noisy

This function implements a low pass filter that smooths a noisy value. ***damped*** provides a damped value of the actual measurement value provided by ***noisy***.



Operator Summary

The following table lists examples of results based on the operators with different parameters.

	Results for: a = ...			
	–2.7183	**0**	**+2.7183**	**nan**
a **else** b	–2.7183	0	2.7183	b
b **if** a	b	nan	b	nan
b **if** a **else** c	b	c	b	c
valid a	1	1	1	0
! a	0	1	0	0
a **>** 0	0	0	1	nan
a **<** 0	1	0	0	nan
a **==** 0	0	1	0	nan
a **!=** 0	1	0	1	nan
a **>=** 0	0	1	1	nan
a **<=** 0	1	1	0	nan
a **%** 1	0.2817	0	0.7183	nan
a **%** 0.01	0.0017	0	0.0083	nan
a–(a%0.01)	–2.72	0	2.71	nan
abs a	2.7183	0	2.7183	nan
int a	–2	0	2	nan
round a	–3	0	3	nan
ln a	nan	nan	1.0000	nan

Variables

Variables The variables **a1**..**an** correspond to the first to nth value inside the data line sent by the first sensor. The **blueberry INPUT module** supplies the voltages of all inputs in Volt as well as the frequency in Hertz and the counted pulses. In addition to the variables, other function names can be used inside a measurement function. They must be defined former to the function in which they are used as a variable. A **#** character in front of a function name provides the measurement value of the previous measurement.

Example: **Temperature Gradient**

Temp (°C) = 100 * a3 – 30
deltaTemp (K/s) = (Temp – #Temp) else 0

deltaTemp provides the temperature gradient between 2 samples.

Predefined Variables (internal Sensors)

The following predefined variables provide values from the senors that are integrated into the **blueberry COMPACT**.

PAIR1..2 provides the barometric pressure and internal temperature measured by the integrated pressure sensor.

Example: Barometric Pressure

pBaro (hPa) = PAIR1
TempShelterbox (°C) = PAIR2

POWER1..4 provides infos about the power supply.

Example: Power Supply

uSolar (V) = POWER1
uBattery1 (V) = POWER2
uBattery2 (V) = POWER3
iSolar (A) = POWER4
*PSolar (W) = POWER1 * POWER4*

This functions provide voltages of the solar module and the two backup batteries. Multiplication of voltage and current calculates the charging power of the solar module.

Predefined Variables (Time Info)

The following predefined variables provide time information.

PERIOD provides the actual measurement period in seconds.

Example: **Integration over Time**

*flow (m3/s) = 125 * b2*
volume (m3) = flow * PERIOD

The function ***volume*** uses ***PERIOD*** to intergrate actual flow into a volume.

TIME provides the time in seconds since 1.1.1970 00:00:00.

DAYTIME provides the time in seconds since 00:00:00 of the current day.

Example: **Flashing Light**

DOUT3 (flash) = ! (DAYTIME % 10)

This function flashes a signal lamp every ***10*** seconds.

YEAR provides the actual calendar year as 4 digit integer (e.g., **2007**).

MONTH provides the actual calendar month as integer (January = 1 .. December = 12).

Example: **Season dependent Factors**

factor = 0.26(MONTH<4) + 0.22*(MONTH==4) + 0.25*(MONTH>4)*

This function selects a factor depending on the month. Some algorithms for determination of potential evaporation (e.g., HAUDE) use empirical factors that vary with the season.

DAY provides the actual calender day as integer (1 .. 31).

HOUR provides the actual hour as integer (0 .. 23).

MINUTE provides the actual minute as integer (0 .. 59).

SECOND provides the actual second as integer (0 .. 59).

WEEKDAY provides the day of the week as integer (Monday = 1 .. Sunday = 7).

YEARDAY provides the day of the year as integer (1st January = 1).

Click **OK** to save the settings into the data logger. As the measurement functions represent virtual channels they are independent of the number of hardware inputs of the data logging system. The user can define an unlimited number of measurement functions.

Data Polling

The **blueberry COMPACT** sends poll commands through the **RS 485** serial port and to the internal measurement interfaces. Each poll command provides a set of return values that are used as variables in the measurement functions. Please set the poll parameters as follows:

Baudrate Select from the **Baudrate** list the baud rate of the serial port. The **blueberry INPUT Module** requires a baud rate of **19200**.

Character Delay Select from the **Character Delay** list the delay between the characters sent by the **blueberry COMPACT** to the serial port. Some sensors (e.g., R.M.Young sonic anemometers) require character delays. The **blueberry INPUT Module** is polled with a character delay of **0**.

Poll Pause defines the delay between the last character of a data line received by the **blueberry COMPACT** and the sending of the next poll command. The **blueberry INPUT Module** requires a poll pause of **50 ms**. The poll pause is required because the **RS 485** bus allows only one component (sensor, **INPUT Module** or data logger) at a time to transmit data. All other components work in receiver mode. The poll pause allows to switch from transmitter to receiver mode.

Timeout defines the maximum time the **blueberry COMPACT** waits for the answer to a poll command. If the polled component does not answer the poll command will be repeated once or several times depending on the value set for **Retry**. If no data was received the measured values are stored as **nan** („not a number“).

Poll Command Enter the poll command into the field **Poll Command** and click **OK** to save the setting into the data logger.

The following poll commands provide measured values from the **blueberry COMPACT** data logger itself:

Command: **#100 f1f2f3f4f5f6f7f8f9f10\r**

or **#100 F\r**

Results:

Index	Value	Unit
1	Frequency of **DIN1**	Hz
2	Frequency of **DIN2**	Hz
3	Frequency of **DIN3**	Hz
4	Frequency of **DIN4**	Hz
5	Frequency of **DIN5**	Hz
6	Frequency of **DIN6**	Hz
7	Frequency of **DIN7**	Hz
8	Frequency of **DIN8**	Hz
9	Frequency of **DIN9**	Hz
10	Frequency of **DIN10**	Hz

Command: **#100 v1v2v3v4v5v6\r**
or **#100 V\r**
Results:

Index	Value	Unit
1	Differential voltage at **AIN1**	V
2	Differential voltage at **AIN2**	V
3	Differential voltage at **AIN3**	V
4	Differential voltage at **AIN4**	V
5	Differential voltage at **AIN5**	V
6	Differential voltage at **AIN6**	V

Command: **#100 s1...s12\r**
or **#100 S\r**
Results:

Index	Value	Unit
1	Single-ended Voltage at **AIN1+**	V
2...5	**AIN2+...AIN5+**	V
6	Single-ended Voltage at **AIN6+**	V
7	Single-ended Voltage at **AIN1–**	V
8...11	**AIN2–...AIN5–**	V
12	Single-ended Voltage at **AIN6–**	V

The following poll command provides temperatures from Pt100 sensors connected as 4-wire circuit to the **blueberry COMPACT**:

Command: **#100 t1...t6\r**
or **#100 T\r**
Results:

Index	Value	Unit
1	Pt100 Temperature at **AIN1**	°C
2...5	...	°C
6	Pt100 Temperature at **AIN6**	°C

The following poll command provides the voltage ratio data from potentiometric wind vanes connected as 4-wire circuit to the **blueberry COMPACT**:

Command: **#100 p1...p6\r**
or **#100 P\r**
Results:

Index	Value	Unit
1	Potentiometer ratio at **AIN1**	V/V
2...5	...	V/V
6	Potentiometer ratio at **AIN6**	V/V

The following poll command provides absolute pressure (QFE) and internal temperature of the built-in barometric pressure sensor of the **blueberry COMPACT**:

Command: **#100 m1m2\r**
or **#100 M\r**
Results:

Index	Value	Unit
1	Barometric pressure	hPa
2	Internal temperature	°C

The following poll command provides supply voltages and charging current of the **blueberry COMPACT**:

Command: **#100 b1b2b3\r**
or **#100 B\r**
Results:

Index	Value	Unit
1	Voltage of the solar module at **POW**	V
2	Voltage of the backup battery at **BAT1**	V
3	Voltage of the backup battery at **BAT1**	V
4	Charging current at **POW**	V

Data Format Select the data format from the list: **decimal** reads the received data values as decimal floating point numbers. **hex** reads the received data values as hexadecimal values and converts them into decimal integer values (e.g., **8A ⇨ 138**).

Click **OK** to save all settings into the data logger.

Digital Outputs (DOUT1..4)

The **blueberry COMPACT** provides 4 digital outputs. They represent switched power supplies that can be used to activate peripheric devices, like modems, sensor heatings, shelter box heating, beacon lights and alarm devices. Please refer to the technical data section for maximum load of the digital outputs.

The status of the digital outputs are defined as measurement functions. The name of the measurement function must be **DOUT1**..**DOUT4** for digital output 1..4. The respective digital output is set to HI if the result of the measurement function is 1 or higher. Otherwise it is set to LO. The status of the digital outputs are logged like normal measurement functions. Digital outputs can be switched depending on time or depending on measurement values.

Example: **Time scheduled Switching**

DOUT1 (0=Off 1=On) = (HOUR>=6) + (HOUR<18)

Switching output **DOUT1** is set active from 6:00 to 18:00 every day.

Alarm E-Mails

The **blueberry COMPACT** sends alarm e-mails at conditions defined by the user.

The alarm conditions are defined as measurement functions. The name of the measurement function must be **ALARM*i*** where ***i*** is the index of the alarm. The number of alarms is not limited. The text of the function name is sent as e-mail when the result of the measurement function is 1 or higher.

Example: **Battery Monitoring**

uBat1 (V) = POWER2
uBat2 (V) = POWER3
ALARM1 Battery Low = (uBat1 < 11.4) + (uBat2 < 11.4)

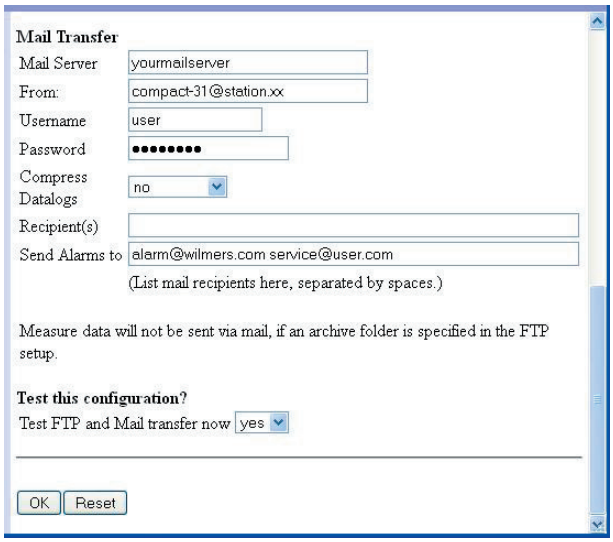
The data logger sends an alarm e-mail with the text **Battery Low** when the voltage of at least one of the backup batteries is below 11.4 V.

To set the e-mail alarm transfer select
Setup > FTP/Mail.

Enter the URL of your mail server (SMTP server) in the field **Mail Server**. If your mail server requires authorization enter the user name and password. Enter the mail addresses in the field **Send Alarms to**. Separate more than one mail address by space characters.

Select **yes** at **Test Mail Transfer now**.

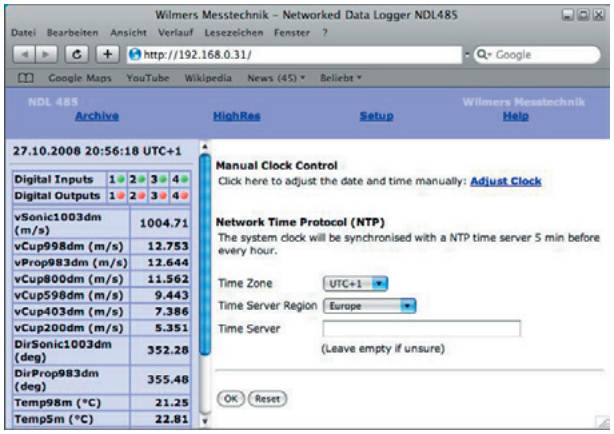
Click **OK** to save the settings. If the **Test Mail** option is active the **blueberry COMPACT** now sends a test mail to all data and alarm recipients. A message displays the result of the test mailing. Please check whether the mail has been sent without errors. Otherwise, please check the correctness of your mail settings.



Date and Time

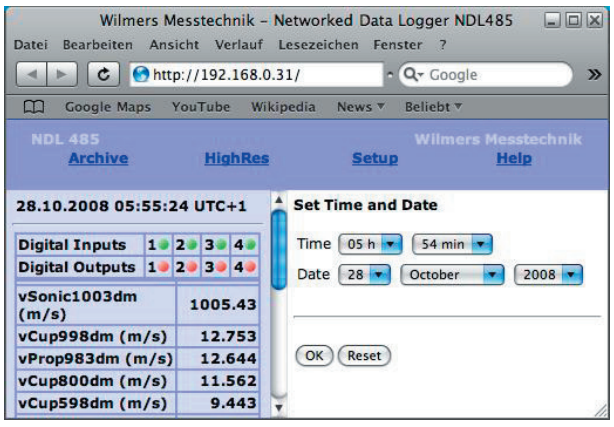
If the **blueberry COMPACT** is connected to the Internet the data logger updates its internal realtime clock automatically from an Internet time server. The **blueberry COMPACT** adjustes the clock to the time zone set by the user.

Select **Setup > Date & Time** to set the parameters for realtime clock synchronization. Select the time related to UTC. Select the region where the data logger is installed. The **blueberry COMPACT** uses the time server the closest to its site in order to provide maximum accuracy. Optionally, select a time server. If you do not define a specific time server the **blueberry COMPACT** automatically selects a suitable server from a pool of time servers. Click **OK** to accept the settings.



If the data logger is not connected to the Internet, select **Adjust Clock** to set the realtime clock manually.

Select the settings from the **Time** and **Date** lists and click **OK**.

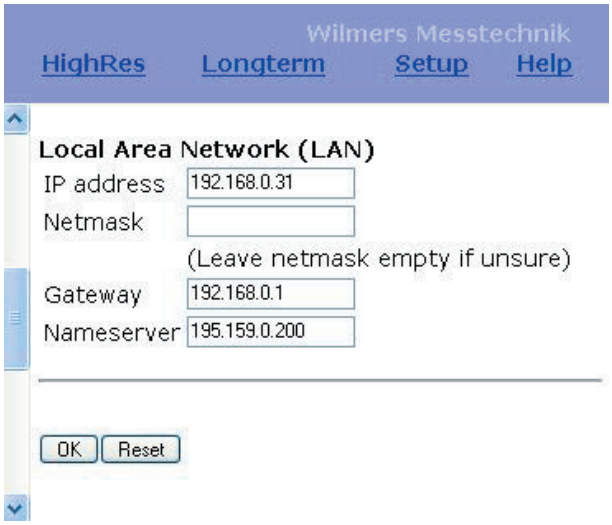


Network Interface

Network Parameters

The **blueberry COMPACT** can be connected locally to a PC via crosspatch cable and it can be integrated into a PC network (LAN) by means of a standard Ethernet cable. The IP address of the data logger has to be adapted to the network.

Select **Setup > Network**.



Assign an IP address to the data logger.

Enter the subnet mask required for your network type. If you are unsure about the subnet mask leave this field empty. In this case, the default subnet mask **255.255.255.0** is used.

Enter the gateway and name server (DNS) of your LAN and click **OK**. The data logger uses the gateway to built up a connection to the Internet in order to send data via e-mail or FTP and to synchronize the internal realtime clock from the Internet.

Internet Integration

The **blueberry COMPACT** is integrated into the Internet by means of a DSL router or in remote sites by means of the **blueberry GSM Module**. The **GSM Module** offers remote data transmission and real-time access via cellular phone networks (900 MHz, 1800 MHz and 1900 MHz). Two operation modes are available:

In **GSM mode**, the data logger is called from a PC by means of a telephone modem, similar to the dial-in connection to an Internet provider. This mode offers direct access to the web server of the **blueberry COMPACT**. In GSM mode, the telephone costs depend on the connection time.

The **GPRS mode** offers full integration of the **blueberry COMPACT** into the Internet. The data logger connects itself automatically to the Internet providing realtime access from any Internet access point. Two password levels protect the data logger against unauthorized access. As GPRS does not use fixed IP addresses a dynamic DNS server (e.g., dyndns.org) manages the dynamic IP address. It provides access via a named URL. The name of the server used by the **blueberry COMPACT** to access the Internet is called Access Point Name (**APN**). Private APNs provide outgoing data transmission from the data logger to the Internet, e.g., via FTP or e-mail. However, they block access from outside into the data logger. Public APNs provide both access types. Dynamic DNS requires a public APN! Please make sure that your GSM provider offers a **public APN**. Public APNs are offered among others by T-Mobile (Germany), TIM (Italy), Telenor (Norway, Sweden), WARID (Pakistan). In GPRS mode, the telephone costs depend on the volume of transmitted data.

Please prepare the following information for the GSM/GPRS setup of the **blueberry COMPACT**:

1. The data number of the SIM card. Please make sure that you are really using the data number. Usually, SIM cards have separate numbers for voice, fax and asynchronous data transmission. We recommend to use SIM cards without voice function. Pure data cards are cheaper than voice cards.

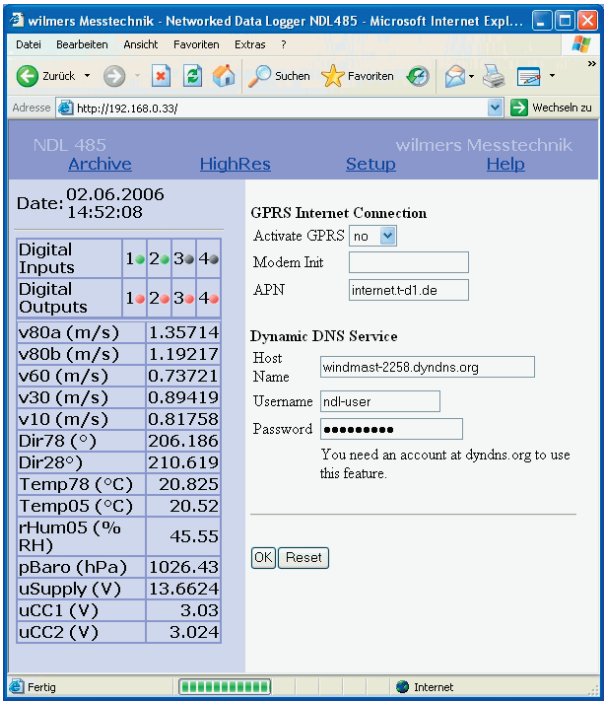
2. The PIN of the SIM card. You must disable the PIN request before use because the **blueberry COMPACT** is not able to enter the PIN. Please insert the SIM card into your mobile phone, enter the PIN and disable the PIN request.

3. The APN. Please make sure that you have got a public APN.

GPRS Connection

Select **Setup > GPRS** to setup a GPRS connection. Select **yes** at **Activate GPRS** and enter the APN and optionally the user name and password at **GPRS Internet Connection**. Please ask your GSM provider for these data. A list of international APNs is available in the Internet at

http://www.quickim.com/support/gprs-settings.html.



When the **blueberry COMPACT** operates in GPRS mode it will switch to GSM mode every day between 20:00 and 21:00. During this time the data logger is accessible via dial-in connection.

Please enter the host name of the data logger in section **Dynamic DNS Service**. Please enter the access code to your **dyndns.org** account in the fields **Username** and **Password**. The host name must be registered at **http://www.dyndns.org** before. Please refer to the following chapter for further details.

Click **OK** to save the settings.

Remote Access via Internet

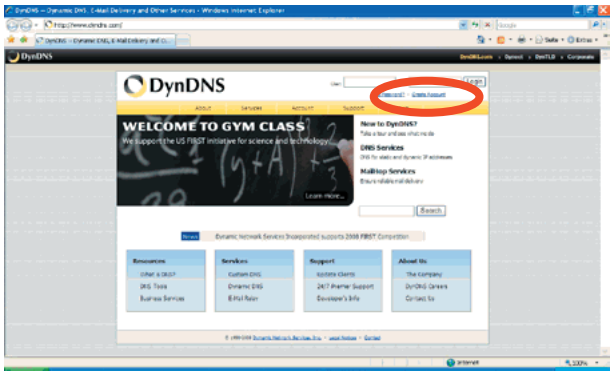
GPRS networks use dynamic IP addresses. Every time the **blueberry COMPACT** connects to the Internet it gets a new IP address from the Internet service provider. If we want to access the data logger via Internet we need to know this IP address. **Dynamic DNS** manages dynamic IP addresses and provides access to them. The user defines a host name for his measurement station (e.g., station-103.dyndns.org). When the **blueberry COMPACT** connects to the Internet it sends its actual IP address to the **DynDNS** server. The **DynDNS** server translates the IP address to the host name of the data logger. This provides us access to the measurement station without knowing its IP address.

Creating a DynDNS Access

Please proceed as follows to create your account and a host at **DynDNS**:

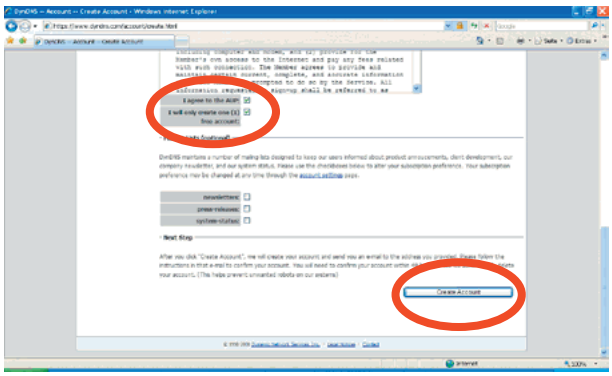
1. Open your Internet browser and visit the web site **http://www.dyndns.org**.

2. Select **Create Account**.

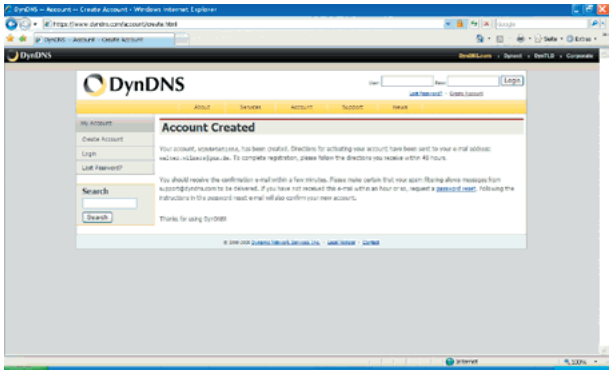


3. Define a user name, a password and enter your e-mail address.

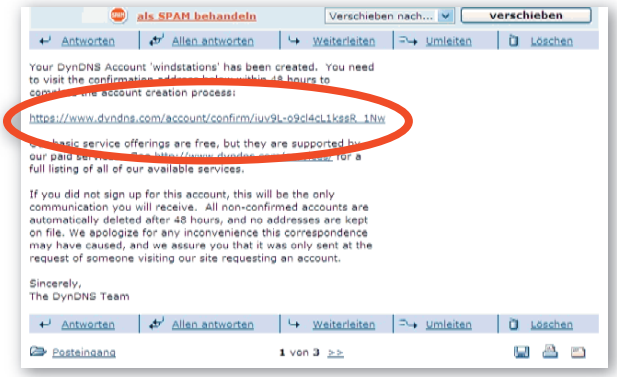
Scroll down and activate **I agree to AUP** and **I will only create one (1) free account**. Click on **Create Account**.



4. A message confirms the creation of your account.



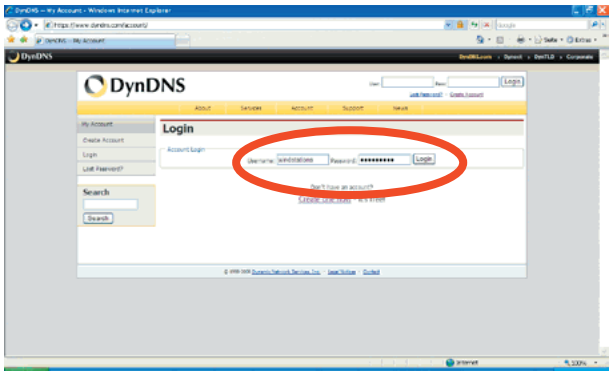
5. You will now receive an e-mail with a confirmation for the **DynDNS** account. This takes typically a few minutes. Open the e-mail and follow the stated link.



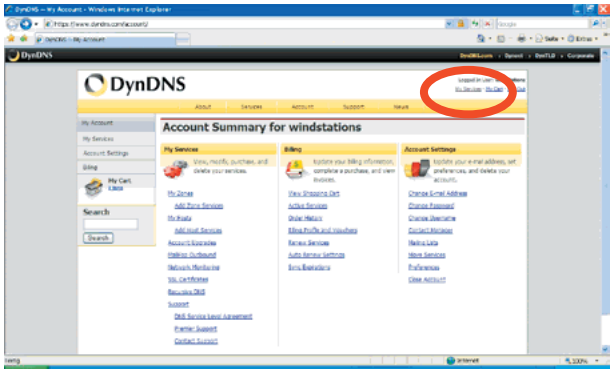
You have now created your account. The next steps create a **DynDNS** host.

6. Select **Login**.

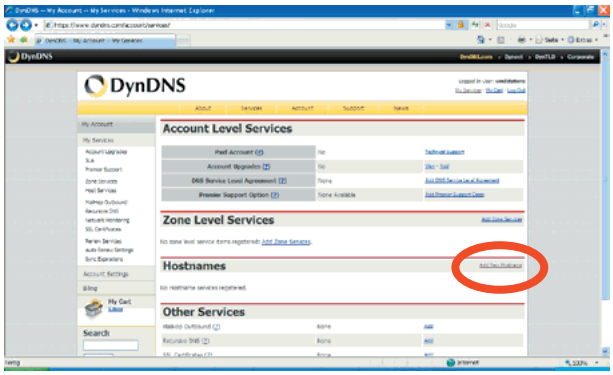
7. Enter your access code (user name and password) and click **Login**.



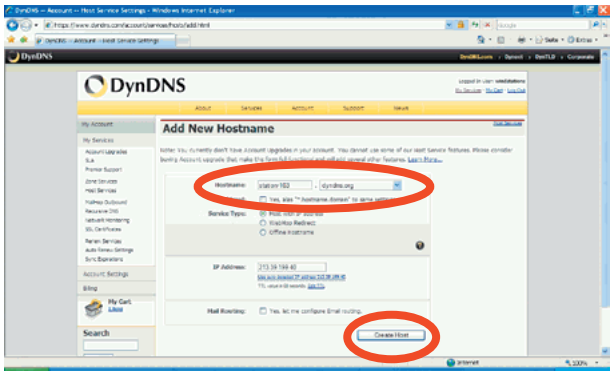
8. Select **My Services**.



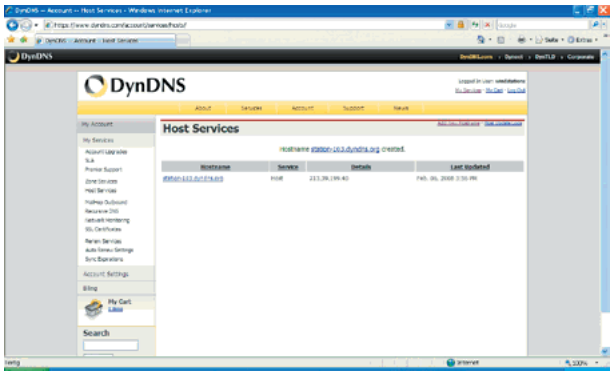
9. Select **Add New Hostname**.



10. Enter a host name and click **Use auto-detected IP address**. Click **Create Host**.



11. A message confirms the creation of the new host.



This host can now be used with the **blueberry COMPACT** (see Setting up the GPRS connection). If you want to create further hosts, please click **Add New Hostname** and repeat step 10.

Accessing the blueberry COMPACT via Internet

Please proceed as follows to access your **blueberry COMPACT** from the Internet:

Start your Internet browser, enter the **DyDNS** host name of your measurement station (e.g., station-103.dyndns.org) into the address field and hit **<enter>**. Do not add **www** to the host name!

The remote Internet access provides the same functionality as the local access via Ethernet. The user can display and download data and diagrams and he can change the configuration.

Accessing the blueberry COMPACT from a Mobile Phone

The **blueberry COMPACT** provides a special web interface adapted to small displays of pocket PCs, MDAs and mobile phones.

Please proceed as follows to access your **blueberry COMPACT** from an Internet capable mobile device :

1. Connect your mobile device to the Internet and start the Internet browser.

2. Enter the **DynDNS** host name of your measurement station into the address field and add /compact to the host name. (e.g., station-123.dyndns.org/compact). Do not add **www** to the host name!

3. Click **Connect**.

4. Enter user name and password of the data logger into the login dialog.

The functionality of the mobile access depends on the browser of your mobile device. Some mobile browsers might not be able of downloading measured data files. **Opera** offers a powerful free browser for mobile phones. Please refer to **http://www.operamini.com** for further details.

Remote Access via GSM

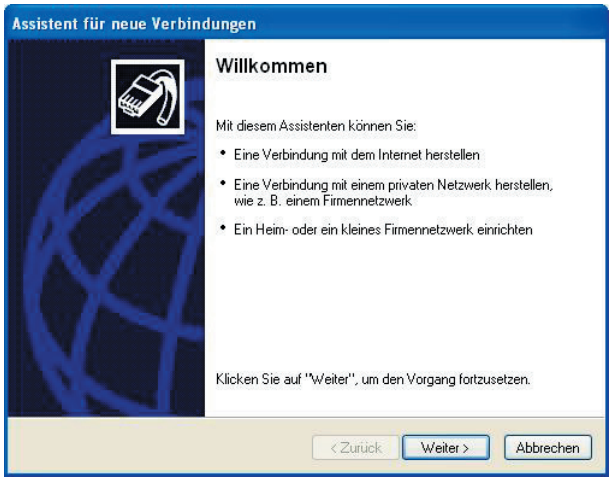
GPRS provides the most flexible and powerful remote access to the **blueberry COMPACT**. It requires a public APN. For GSM providers that do not offer a public APN, the **blueberry GSM Module** provides remote connection to the **blueberry COMPACT** via PPP. This operation mode is similar to a dial-in connection to an Internet server. It requires a PC with analogue telephone modem.

Setting up the GSM Connection

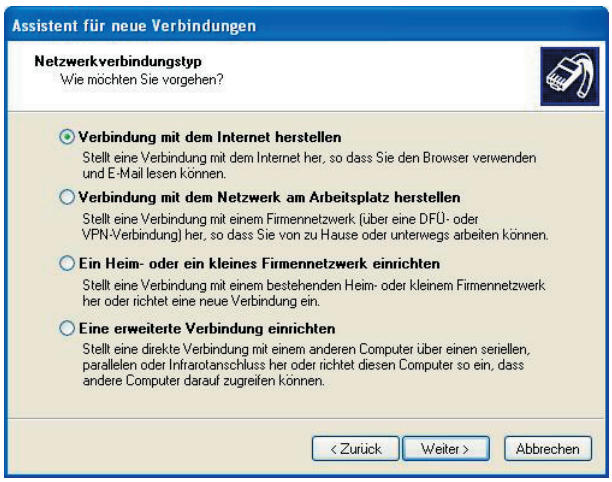
Please proceed as follows in order to configure your Windows PC for a GSM remote connection:

1. Select **Start > Settings > Network and Dial-In Connections > New Connection**. A wizard will lead you through the configuration process.

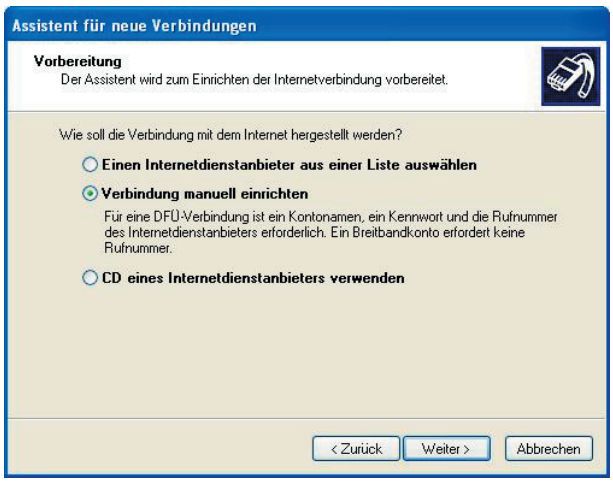
2. Click **Next**.



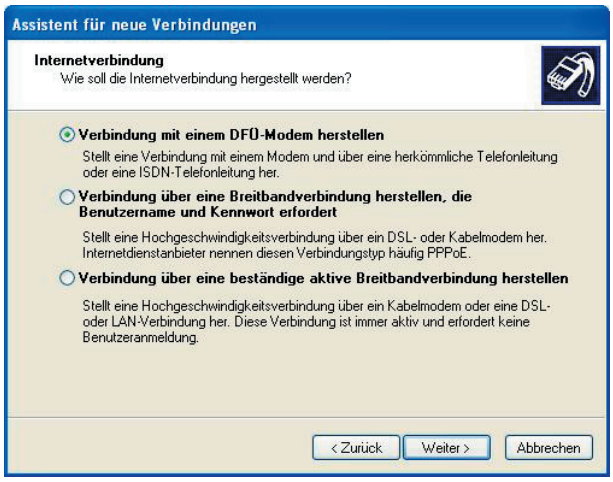
3. Select **Establish an Internet Connection** and click **Next**.



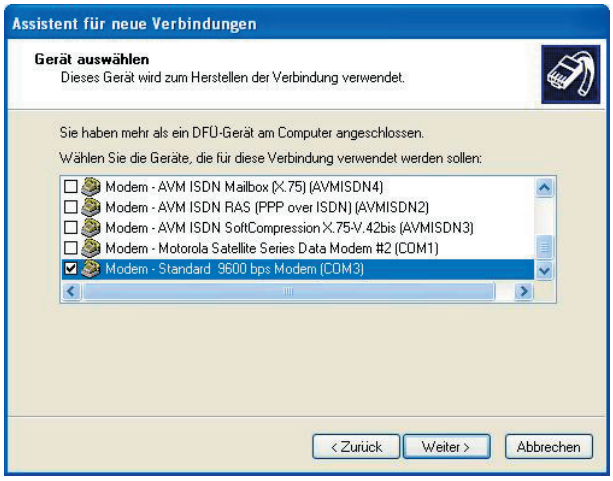
4. Select **Manual Connection** and click on **Next**.



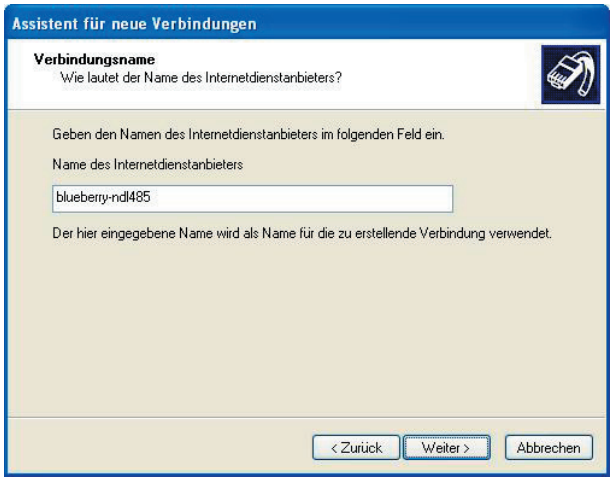
5. Select **Modem Connection** and click **Next**.



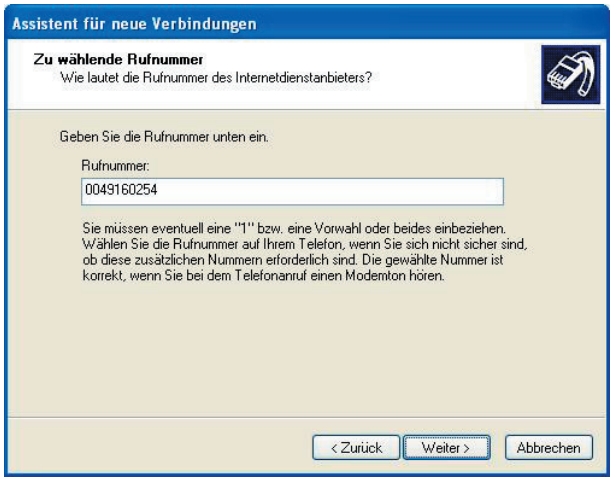
6. A list displays all modems available on your PC. Select the modem to be used for remote data transmission and click **Next**.



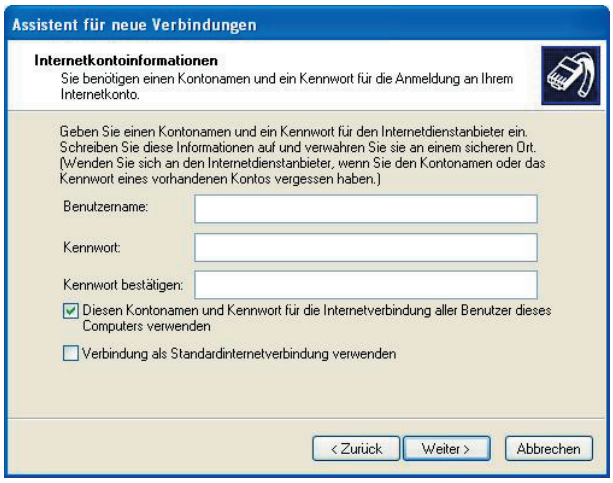
7. Enter a name for the remote connection, e.g., the name of the measurement site and click **Next**.



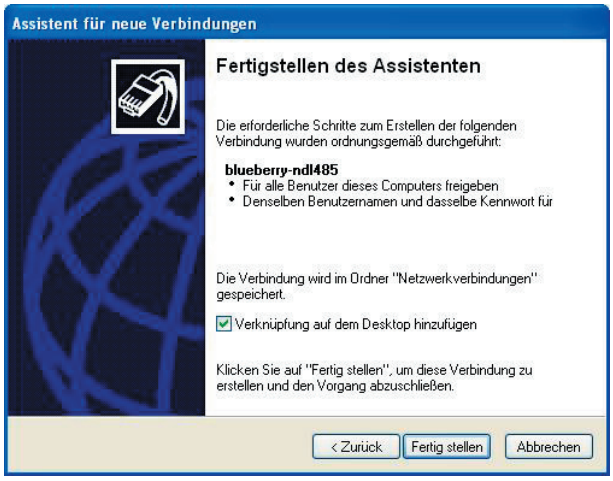
8. Enter the telephone number of the GSM modem. GSM SIM cards have separate numbers for fax and data transmission. Please make sure to use the data number. Click **Next**.



9. Click **Next** without entering the access code in the dialogue.



10. Click **Next** to finish the configuration.



This chapter describes the configuration process under **MS Windows XP**. Similar wizards assist you at the configuration under **Windows 2000**, **Mac OS** or **Linux**.

Accessing the blueberry COMPACT via GSM

Please proceed as follows in order to establish a remote connection to the **blueberry COMPACT** via GSM:

1. Select **Start > Settings > Network and Dial-In Connections >** ***blueberry-ndl485*** where ***blueberry-ndl485*** is the name of your remote connection.

2. Click on **Dial** without entering the access code. A dialogue diplays the progress while connecting. When the connection has been established the dialogue box changes into an icon in the lower right corner of the task bar.

3. Once the connection is established, please start your Internet browser, enter the IP address **10.1.1.1** into the address field of the browser and hit the **<enter>** key. Please note that this IP address is the same for all **blueberry COMPACT** units. It is independent of the IP address set at **Local Network Settings**.

4. Enter the user name and password for the **blueberry COMPACT** and click **OK**.

5. In GSM mode, the web interface provides all functions that are available at local or at GPRS connection.

6. To disconnect the GSM connection click on the connection icon with the right mouse botton and select **Disconnect** from the popup menu.

Password Protection

Two password levels protect the **blueberry COMPACT** against unauthorized access:

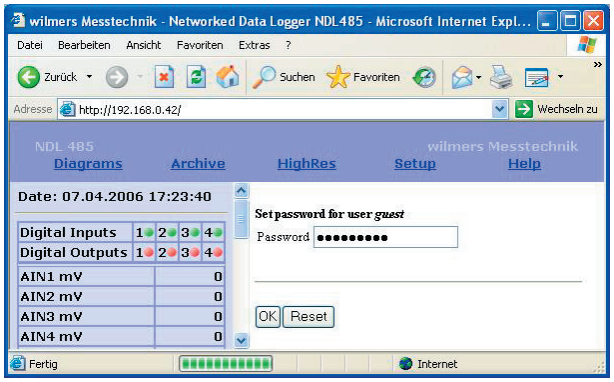
The user **guest** is allowed to view actual measured data and configuration settings and to download measured data. He is allowed to set date and time. The user **guest** is not allowed to delete measured data or to change any configuration settings.

The user **admin** has all rights. He is allowed to delete measured data and to change configuration settings.

User Password

Login as user **admin** with the original admin password and select **Setup > Password**. Enter the new password for user **guest** and click **OK**.

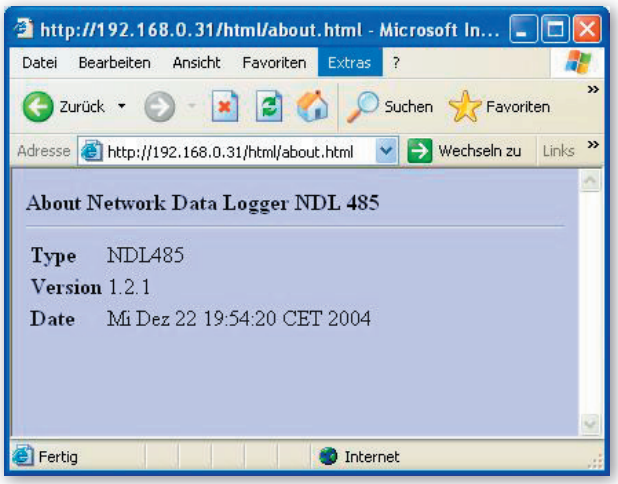
The original password for the user **admin** cannot be changed. You can however define a second admin password. The second admin user has all rights except the one to change his own password.



Help Function

The help function the **blueberry COMPACT** provides system information about the data logger as well as an online manual.

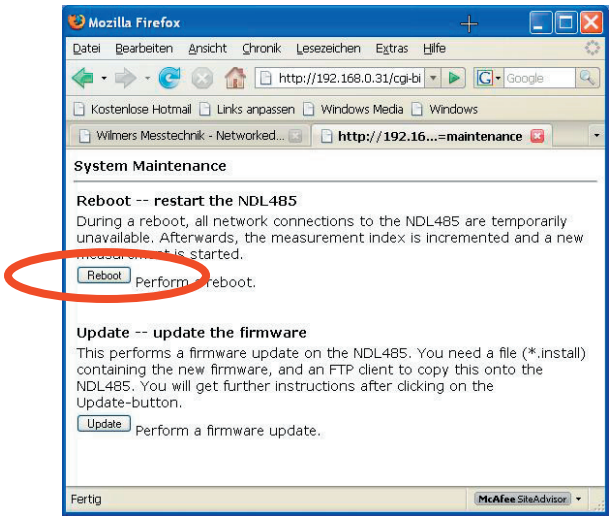
Select **Setup > Help > About**. The dialog indicates information about type and firmware version of the data logger.



Rebooting the blueberry COMPACT

The **blueberry COMPACT** can be rebooted in two ways: by interruption of the power supply and via the web interface. In order to reboot the **blueberry COMPACT** via the web interface please proceed as follows:

1. Start the web browser and login to the **blueberry COMPACT** as user **admin**.
2. Select **Help > About > Maintenance**.
3. Click on **Reboot**.



4. Wait 2 minutes until the data logger is up again.

FTP Access

Some operations, like deleting measured data and applying a firmware update require FTP access to the **blueberry COMPACT**. The following describes the establishment of an FTP access by means of the free FTP client **FileZilla**.

Installing FileZilla

The FTP client **FileZilla** can be downloaded free of charge from the Internet at the following site:

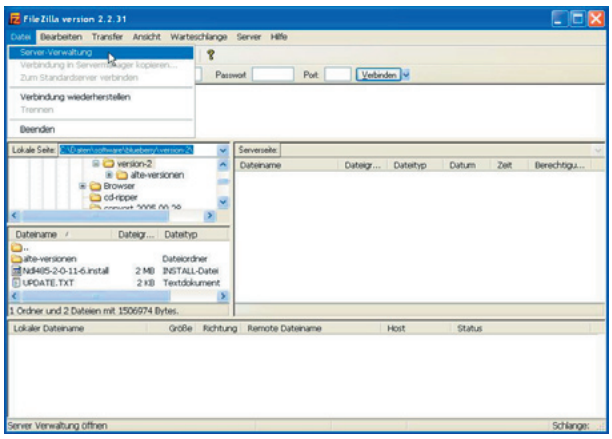
http://sourceforge.net/projects/filezilla

In order to install **FileZilla** and to configure it for the **blueberry COMPACT** please proceed as follows:

1. Download the software from the above stated website and install it according to the instructions of the supplier.

2. Start **FileZilla**.

3. Select **File** > **Server Mangement**.



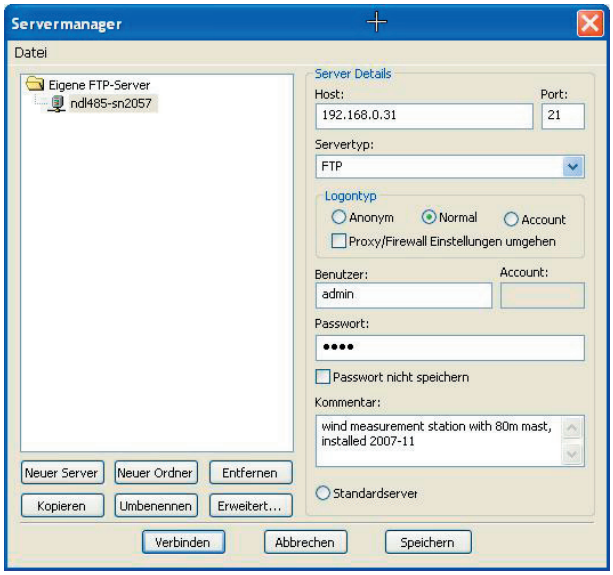
4. Select **New Server** and enter a name for the data logger.

5. Enter the IP address of the **blueberry COMPACT** into the **Host** field.

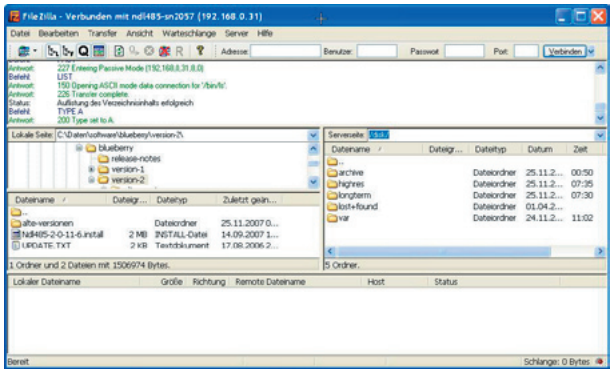
6. Select the logon type **normal**.

7. Enter the user name **admin** and the admin password of your **blueberry COMPACT** .

8. Click on **Save** to save the settings.



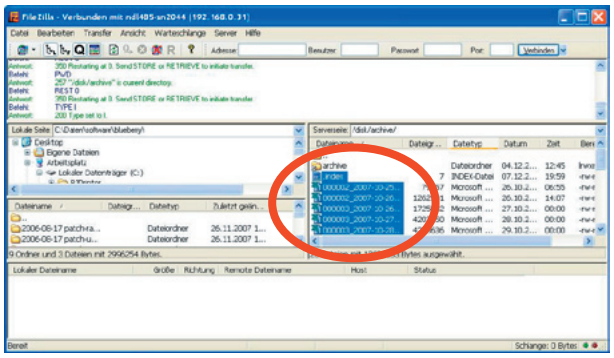
9. Click on **Connect** to built up the connection to the **blueberry COMPACT**. The right part of the screen displays the file system of the **blueberry COMPACT**. You can use the FTP client like a file explorer to delete measured data files from the **blueberry COMPACT** and to move files from the **blueberry COMPACT** to your local computer or from your computer to the **blueberry COMPACT**.



Deleting Measured Data

The **blueberry COMPACT** saves measured data in a ring buffer. The oldest data lines are automatically overwritten when the data memory is full. Usually, deleting of measured data is only necessary at the beginning of a new measurement, e.g., if the data logger is moved to another site. In order to delete measured data please proceed as follows:

1. Establish an FTP connection to the **blueberry COMPACT**.
2. Double click on **archive** to change to the archive directory.
3. Mark all files to be deleted and press **<Del>**.

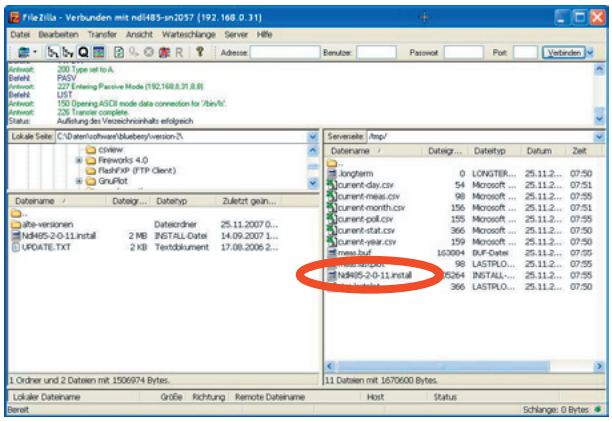


If only data files (*.csv) are deleted the measurement index continues with the actual value. In order to reset the index please delete the file **index**.

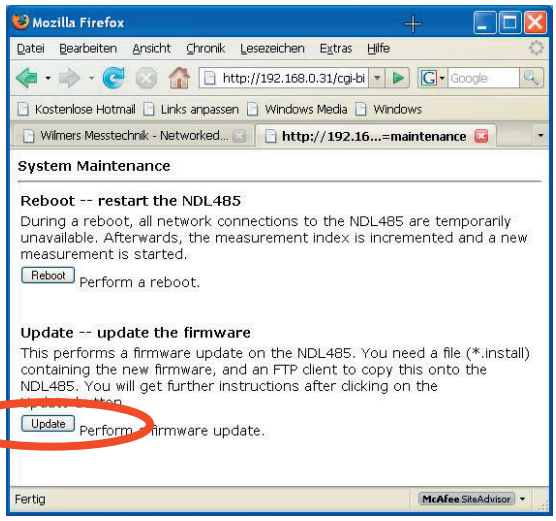
Updating the Firmware

The firmware of the **blueberry COMPACT** can be updated via local Ethernet connection or remotely via GSM, GPRS or DSL. In order to update the firmware of the **blueberry COMPACT** please proceed as follows:

1. Establish an FTP connection to the **blueberry COMPACT**.
2. Double click on **..** to change to the root directory.
3. Open the folder **/tmp**.
4. Change on the local computer to the folder that contains the firmware update file.
5. Click with the right mouse button on the firmware update file (e.g., Ndl485-2-0-11.install) and select **Upload**. Now, FTP transfers this file to your **blueberry COMPACT**.
6. Please wait until the transfer is sucessfully completed. The uploaded file is now visible in the **/tmp** folder of the **blueberry COMPACT**.



7. Start the web browser and login to the **blueberry COMPACT** as user **admin**.
8. Select **Help > About > Maintenance**.
9. Click on **Update** in order to start the update process.



10. Please follow the instructions displayed on the screen. The update process will take approx. 5 minutes. The **blueberry COMPACT** will restart automatically after the update is completed. Regular flashing of the **BUSY** LED at the data logger indicates that the **blueberry COMPACT** is up again.

IMPORTANT NOTE:
The **blueberry COMPACT** must never be disconnected from the power supply during update process! Interruption of the update process can block the operation of the **blueberry COMPACT**.

Please restart the web browser and login to the **blueberry COMPACT**.

In order to check whether the update was successfull please select **Help > About**. Check whether the indicated firmware version corresponds to the update you went to apply.

Adapting the PC Network Settings

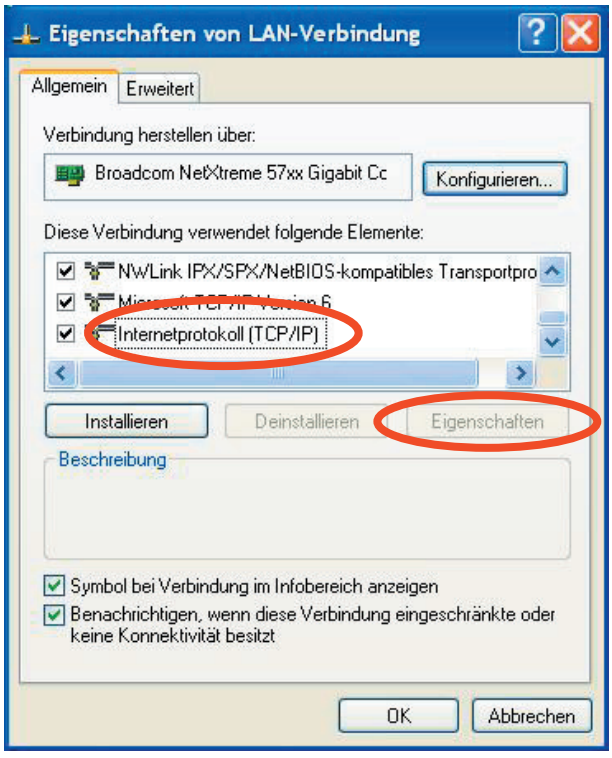
When the **blueberry COMPACT** is connected to a PC or a LAN the network settings of the PC must comply to those of the data logger.

In order to change the network settings of the PC please proceed as follows:

1. Right click on the network icon in the task bar and select **Open Network Settings**.

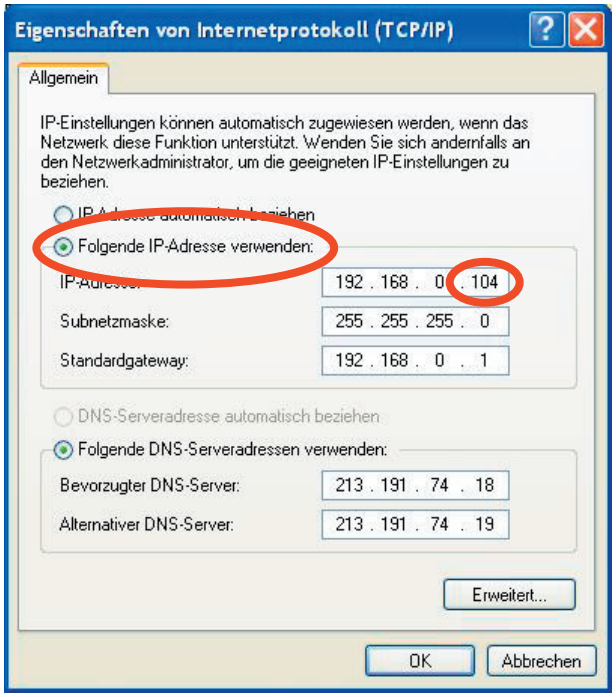
2. Double click on **LAN Connection**.

3. Select **Internet Protocol (TCP/IP)** from the list and click on **Properties**.



4. Activate **Use the following IP Address**. Enter the IP address, subnet mask and gateway according to the settings in the **blueberry COMPACT**. The **blueberry COMPACT** has two IP addresses: one is the fixed IP adress **192.168.111.1**. This IP address cannot be changed. The second IP address can be changed by the user. Please refer to the label on the data logger for its default settings. The last entry of the IP address must be different from the setting of the data logger. All other settings must be set identical to the data logger.

   Example:
   Data logger: 192.168.0.**31**
   PC: 192.168.0.**104**



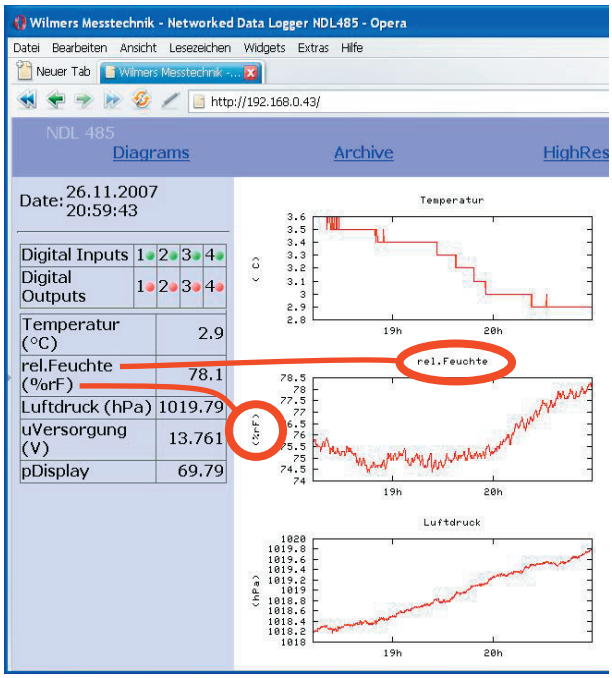
5. Click **Ok** to accept the settings.

Displaying Diagrams

The **blueberry COMPACT** generates time series plots of all measured values and displays them as diagrams. The texts for title and y label of the diagram axes are taken from the name of the measurement function: the first part of the function name is used as diagram title, the second part is used as y axis label. First and second part must be separated by a space character. We recommend to write function names as **Value (unit)**.

Example:
relFeuchte (%rF) = *100 * a4*

The diagram titel for this function is ***relFeuchte***, the y axis label is ***(%rF)***.



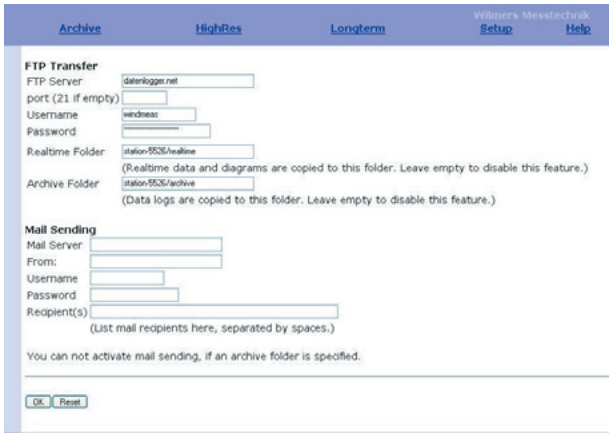
Shorttime diagrams display a time series of the samples. Statistics diagrams display a time series of the statistics.

Transmitting Measured Data via FTP

The **blueberry COMPACT** sends measured data automatically via FTP to a website or to a data file server. Please first setup the Internet integration via DSL or GPRS.

Select **Setup > FTP/Mail**.

Enter the URL of your FTP server in the field **FTP Server.** Enter the destination folder and access code and click **OK** to save the settings.



ANNEX

Technical Specifications (compared to NDL 485)

Model	blueberry COMPACT	NDL 485 research
PartNo.	0141	0103
Measuring Inputs		
Digital inputs	10	6
Analogue inputs	6 differential or 12 single ended	6 single ended
Additional inputs	via RS485 and INPUT modules (8 x AIN/DIN per module)	
Serial inputs	RS485, half-duplex, RS232 for Modem	
Digital Measuring Inputs (DIN1 .. DIN6 / DIN10)		
Measuring range	frequency 0 .. 2,000 Hz counter 0 .. 2,000 Hz status HI / LO	
Resolution	0.01 Hz	
Accuracy	frequency ± 0.1% counter ± 1 pulse	
Signal level	HI = >2.5 V LO = <0.7 V or potential free switch closure	
Input impedance	>20 kΩ	
Analogue Measuring Inputs (AIN1 .. AIN6)		
Measuring range	0 .. 10 V	
Resolution	16 Bit (0.2 .. 0.01 mV depending on measurement range) // 16 Bit (0.2 mV)	
Accuracy	depending on measurement range // ± 0.1% of reading ± 1 mV	
Input impedance	>1 MΩ	
Barometric Pressure Sensor		
Type	integrated baro sensor	-
Measuring range	400 .. 1,100 hPa	-
Resolution	0.1 hPa	-
Accuracy	±0.2 hPa @ 700 .. 1,100 hPa	-
Longterm stability	±0.5 hPa/a	-
Measuring Functions	**blueberry COMPACT**	**NDL 485 research**
Measuring interval	1 s .. 24 h	0.1 s .. 24 h
Statistic interval	1 s .. 24 h	0.1 s .. 24 h
Statistic funcions	mean value (arithmetic + vector), standard deviation (arithmetic + vector), minimum, maximum, sum	mean value (arithmetic + vector), standard deviation (arithmetic + vector), minimum, maximum, sum, median

Data memory for statistic time series	32 MB non-volatile ring buffer	128 MB, expandable to up to 512 MB, non-volatile ring buffer
Data memory for samples	32 MB non-volatile ring buffer	
Communication	**blueberry COMPACT**	**NDL 485 research**
Data interface	RS232 interface, 1,200 .. 115,200 baud, RS485 interface, half-duplex, 1,200 .. 115,200 baud, Ethernet interface (LAN), 10 MBit/s, optional MODBUS-TCP protocol	
Remote data transfer	GSM, GPRS, DSL, ISDN router	
Automatical data transmission	via eMail	via eMail and FTP
Internet integration	via GPRS or DSL	
User interface	web interface, Internet browser	
Graphical data display	-	realtime diagrams of measured values, optional custom specific graphical display
Display	-	
Power Supply		
External power supply	5 .. 24 VDC	
Internal power supply	-	
Power consumption	typ. 600 mW (50 mA @ 12 V)	
Sensor excitation **EXC**	5..24 VDC switched, max. 500 mA	
Switching outputs **DOUT1 .. DOUT4**	4 switching outputs, max. 300 mA, HI = supply voltage, LO = 0 V, time or event triggered	
Mechanic and Operation Conditions		
Casing	65 x 105 x 127 mm, IP20 top-hat rail housing, anodized aluminium	
Connections	screw terminals, connectors	
Temperature range	–40..+70 °C	

CE Compliancy Declaration

Based on test report no. EMV-08/8117-1 of 22.07.2008

Manufacturer: Wilmers Messtechnik GmbH
Hammer Steindamm 35
D-22089 Hamburg / Germany

Product: Data logger **blueberry COMPACT**

Part number: 0141

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